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BORON STEEL

Second Revised Edition, 1953 — Ernest E. Thum, *Editor*

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7301 Euclid Ave., Cleveland 3, Ohio

Metals Review

THE NEWS DIGEST MAGAZINE • VOLUME XXVIII, No. 3 March, 1954

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ASM REVIEW OF METAL LITERATURE

Gives Hints for Steel Selection

The Boston Chapter Heard Carl F. Floe, Professor of Metallurgy at the Massachusetts Institute of Technology, Discuss "Selection of the More Common Steels" Recently. Shown are, from left: H. D. Stuck, technical chairman and chairman of the educational committee; R. C. Seamans, Massachusetts Institute of Technology, the coffee speaker; and Professor Floe

Speaker: Carl F. Floe

Massachusetts Institute of Technology

"Selection of the More Common Steels" was the subject of a talk given by Carl F. Floe, professor of metallurgy at Massachusetts Institute of Technology, at a Boston Chapter meeting. This lecture was arranged to supplement the current educational course and Dr. Floe's presentation of a complex subject was of value not only to those enrolled in the educational course but also aroused the interest of the regular membership.

Dr. Floe stated that the general basis for selection of steels involves consideration of the relative importance of weight or space and cost and reliability in an engineering structure. Experience is of great value in weighing the factors involved since premature failures are usually due to unforeseen circumstances. Approximately 80% of premature failures are caused by fatigue (initiated by unintentional machined notches), corrosion fatigue, undetected material defects and residual stresses. Other causes are wear, corrosion, and overload resulting from use of materials of insufficient strength.

For applications involving both wear and fatigue, carburized or nitrided steels are preferable to high-carbon fully hardened steels, since the former are easier to machine, and after heat treatment the residual surface stresses are in compression, whereas the through-hardening steels are difficult to process and the residual surface stresses are in tension. These residual tensile stresses may initiate fatigue failures.

Production of the proper combination of tensile strength, yield strength, impact properties, ductility and fatigue properties is primarily dependent only on the number, size and shape of the carbide particles in the ferrite matrix. The role of alloys is to assist in obtaining martensite throughout the mass of the part on quenching. However, the choice of alloy is necessarily based on considerations other than its efficiency as a martensite producer or an improver of hardenability.

Dr. Floe described the use of manganese, silicon and nickel, and their effect on various properties of steels. The beneficial effects of molybdenum in the reduction of temper brittleness, refinement of grain size and resistance to tempering were pointed out, and it was predicted that future trends will be toward the use of this alloy in conjunction with chromium and manganese in preference to the single-alloy type of steel.

All of the quenched and tempered alloy steels which are subjected to alternating loads should be tempered at 800° F. or higher to relieve the residual tensile stresses at the surface. The available mechanical property charts for alloy steels should be consulted in selecting a steel that will produce the required combination of mechanical properties when properly tempered.—**Reported by R. A. Pomfret for the Boston Chapter.**

You're Welcome— And Thanks, John

The following letter was recently received by W. H. (Bill) Eisenman, national secretary A.S.M., from John Colin Campbell, a recipient of one of the A.S.M. Foundation for Education and Research scholarships.

"This is not the type of letter in which you should be called by your first name but I feel I can do so after reading "Bill's Column" in *Metal Progress*. May I compliment you on such an informative and well-written yet informal column.

"Thank you very sincerely for the $400 scholarship in metallurgical engineering which I have received from the American Society for Metals through you. Even before receiving this magnificent award, I felt I owed a debt to the A.S.M. for their publications, *Metal Progress, Metals Review* and the A.S.M. Review of Metal Literature. The volumes in our library here at Nova Scotia Technical College are in constant use. This scholarship has only added to my indebtedness to the A.S.M.

"I was very pleased to see the article in *Metal Progress* about my boss of last summer—Mr. C. Mackie, director of metallurgy and research for Dominion Steel and Coal Corp. in Sydney, N. S. Mr. Mackie is truly a great metallurgist.

"Again thanks to you and your Society for this wonderful award."

Fort Wayne Hears Talk On Strength of Metals

Speaker: Howard Scott

Westinghouse Research Laboratory

The Fort Wayne Chapter heard Howard Scott, manager of the metallurgy and ceramic department of the Westinghouse Research Laboratory, speak on "Factors Determining the Strength of Metals" at a meeting held recently.

Mr. Scott's talk dealt mainly with the analysis of fractures. It was evident from the number of complex variables arising from an analysis of stresses that fractography was a subject which could not be simplified in one evening's lecture. However, Mr. Scott covered such factors as retained austenite, types of fracture strength, torsional fracture, hardness and mechanism of fracture.

Mr. Scott illustrated the effect of four metallurgical variables (grain size, cold work, strain rate and grain boundary precipitate) on yield and brittle fracture strength and transition temperature of body centered cubic metals.—**Reported by G. R. Hemmeter for Fort Wayne.**

IMPORTANT MEETINGS *for April*

Apr. 6-9—The Institute of Physics. Conference on the Physics of Particle Size Analysis. University of Nottingham, England. (The Secretary, I.O.F., 47 Belgrave Sq., London, S. W. 1.)

Apr. 14-16—Society for Experimental Stress Analysis. Spring Meeting. Netherlands Plaza Hotel, Cincinnati, Ohio (W. M. Murray, Secretary, S.E.S.A., P. O. Box 168, Cambridge 39, Mass.)

Apr. 26-30 — American Society of Tool Engineers. Industrial Exposition. Philadelphia. (H. E. Conrad, Executive Secretary, A.S.T.E., 10700 Puritan Ave., Detroit 21, Mich.)

Advantages of Shell Molding Over Other Casting Methods

Speaker: Myron DeHollander
General Electric Co.

The Louisville Chapter heard Myron DeHollander, manager of sales, foundry department, General Electric Co., speak on "Shell Molding" at a recent meeting.

Mr. DeHollander described the method of producing a shell mold. This method consists of dropping a mixture of fine, dry sand and powdered phenolic resin onto a heated metal pattern surface. The sand mixture is permitted to remain on the pattern for a few seconds, after which the excess mixture is tipped or dumped from the pattern. A gummy, dough-like sand substance called a shell is left adhering to the heated pattern. The pattern and the uncured shell are then subjected to additional heat to complete the curing or baking process. After the curing process is completed, the shell is stripped or ejected from the pattern. In a like manner, a mating half-shell is produced to complete the desired mold. The two halves are then placed together to form a mold cavity that is ready to be filled with the specified molten metal. This process was well illustrated with slides by the speaker.

Castings can be produced by the shell molding method in virtually all metals. General Electric has produced castings in a wide variety of sizes and shapes by this process in weights from ounces up to 50 lb.

Some of the advantages of castings produced by the shell molding process are:

1. Tolerances can generally be held closer than by conventional methods but not as close as small investment castings.
2. Less draft is required than for sand molding.
3. Castings can be poured with thinner wall sections and with metal at lower temperatures than is possible in sand.
4. Small cored holes, intricate pockets and sharp contours are frequently possible.
5. Improved cast surface appearance.
6. Shell molding eliminates considerable heavy manual labor and thus makes foundry work less objectionable.
7. Elimination of mechanical casting defects.
8. Unlike sand molds, shell molds can be readily stored.
9. Many of the above advantages permit cost reduction by eliminating many machining operations, increasing yield of good castings, decreasing amount of metal required, etc.

There is still considerable debate about the relative cost of shell molded versus conventional sand castings. Mr. DeHollander stated that no generalization is possible because the cost of the two methods will vary with the pattern requirements of individual parts. He discussed some of the factors involved.

According to Mr. DeHollander, shell molding will find its main application in two areas. The first and most important is in those parts which are not now castings, which include forgings and parts machined from solid stock. The second area is in those castings currently produced by conventional methods where superior dimensional control or other factors, such as extensive machining, can be accomplished through shell molded castings.

Mr. DeHollander displayed some shell molds and cores produced for shell molding and various castings, including gears. The advantages of the shell molding process in certain cases were illustrated very effectively by boards upon which were mounted castings made by conventional and shell molding processes.—**Reported by F. F. Dietsch for Louisville.**

Penn State Offers Courses

The Pennsylvania State College, State College, Pa., is offering a series of review courses for practicing engineers who plan to take professional examinations for State registration in Pennsylvania. Instruction will cover those phases of engineering with which the engineer should be familiar to be prepared for the examination.

Courses in mechanical, metallurgical, mining, civil, electrical and petroleum engineering may be organized in any community in the State where there is sufficient need. Arrangements will be made by the Penn State Center in the area. A class may be started at almost any time a group is organized. The total charge for the 64 hours of instruction in any of the fields covered is $36.

Carolinas Hear Arc Welding Talk

A. N. Kugler, Chief Welding Engineer, Air Reduction Sales Co., Spoke on "General Arc Welding" at a Meeting of the Carolinas Chapter. Shown are, from left: W. O. Couch, sales manager, Air Reduction Sales Co., technical chairman; Mr. Kugler; A. R. Fairchild, metallurgist, Western Electric Co., Chairman; and G. Ballentine, Jr., Precision Machine Works, Inc.

Speaker: A. N. Kugler
Air Reduction Sales Co.

Arthur N. Kugler, chief welding engineer of Air Reduction Sales Co., gave a talk on "General Arc Welding" to some 60 members and guests of the Carolinas Chapter recently.

Though the main portion of Mr. Kugler's talk concerned arc welding, the latest phases of all the general welding processes were reviewed. Using the American Welding Society's "Master Chart of Welding Processes", Mr. Kugler reviewed briefly the main classifications of welding and their applications. He mentioned the newer techniques and filler rods employed in these operations.

In discussing arc welding, processes using the metal and carbon electrodes, both shielded and unshielded, were explained in some detail. Emphasis was placed upon the selection of the correct filler rod to be used in welding the various metals. Also, discussed were the methods of selecting the proper welding process for a particular job.

Mr. Kugler explained the development of a new welding process, namely, the Aircomatic process, pointing out that it is similar in some respects to the inert-gas tungsten-arc process. In the new process an arc is maintained between a filler wire continuously fed from a reel through an inert-gas shield. The inert gas serves to exclude the oxygen and nitrogen of the atmosphere, protect the molten metal in transfer across the arc and cool the equipment in the vicinity of the arc. A film on welding illustrated many points made by the speaker.—**Reported by Moss V. Davis for the Carolinas.**

Talks on Alloys for Elevated Temperature Service

E. N. Skinner, Development and Research Metallurgist at International Nickel Co., Is Shown Delivering His Talk on "Alloys for Elevated Temperature Service" Before a Meeting of the New Orleans Chapter Held Recently

Speaker: E. N. Skinner
International Nickel Co.

"Alloys for Elevated Temperature Service" was the topic E. N. Skinner, development and research metallurgist, International Nickel Co., discussed at a meeting of the New Orleans Chapter.

He first reviewed the fundamental principles of creep in metals under load at elevated temperatures and the various stages associated with the creep mechanism. Curves were shown of the creep characteristics of various metals and alloys including the common grades of stainless steel, nickel and cobalt-base alloys and molybdenum. Dr. Skinner presented photomicrographs of various metals and alloys after exposure to different atmospheres of chlorine, sulfurous products, fluorine and other corrosive gases as well as molten metals. He clearly demonstrated that the materials which showed the best resistance against high-temperature corrosion did not, in many instances, exhibit outstanding strength at elevated temperatures.

The advantages and disadvantages of wrought materials vs. castings for heat-resisting applications were discussed. It was pointed out that it is necessary to cast certain compositions as they are not readily forged at elevated temperatures. While having greater strength and usually lower cost, the principal disadvantage of casting is often the inability to obtain a completely sound and homogeneous structure.

Dr. Skinner concluded his lecture by showing slides of several parts which had failed in service under high-temperature corrosive conditions.—**Reported by F. O. Ransom for the New Orleans Chapter.**

Future of Atomic Power In Industry Predicted At New York Meeting

Speaker: John R. Dunning
Columbia University

At a meeting of the New York Chapter, John R. Dunning, dean of the engineering school of Columbia University, discussed the "Outlook for Industrial Atomic Power" in terms of availability of uranium, the atomic fuel, and its comparative cost as a fuel source.

"Visible" supplies of uranium are roughly equivalent to 25 times the known coal reserves, and Prof. Dunning expressed the belief that continued searching would increase uranium reserves.

U-235, the uranium isotope which would serve as the source of power in an atomic reactor, is present in uranium to the extent of 0.7%. A pound of U-235 would cost around $9000, according to recent A.E.C. statements. However, Prof. Dunning pointed out, since one pound of U-235 could supply the power of 3,000,000 lb. of coal, the cost of atomic fuel would be roughly equivalent to coal at $6 per ton. This price is competitive with current fuels, which range in cost from $2 to $25 per ton of equivalent output. The price of $6 per ton does not take into account the fact that a nuclear reactor can breed new fuel and if this is included, the cost of atomic fuel can be reduced to a point considerably below that of present-day fuels.

Current capital investment costs for atomic power plants are placed as high as $1400 per kilowatt as compared to $200 per kilowatt for conventional fuels. Prof. Dunning indicated that this situation existed because of the high costs inevitable in the initial phases of technical development of a new field and are incurred in part by the large factors of safety in design, necessitated by current lack of knowledge. When experience provides the necessary knowledge, Prof. Dunning feels that capital and operating costs will be greatly reduced.

In short, Prof. Dunning expressed the opinion that atomic power would certainly be used in the future because of the limited supply of present-day fuels, because atomic fuel is now competitive in price with many current fuels, because adequate supplies of uranium are available and because capital investment costs for atomic power would decrease.

At the conclusion of the meeting the speaker was presented with an "Atomic Cocktail," a bottle of champagne.—**Reported by Harold Margolin for the New York Chapter.**

Value of Hardenability Tests Shown at North Texas

Speaker: Peter Payson
Crucible Steel Co. of America

The North Texas Chapter heard Peter Payson, assistant director of research for the Crucible Steel Co. of America, speak on the "Hardenability of Steels" at the January meeting.

Mr. Payson illustrated his talk with slides depicting end-to-center hardness values to indicate the effect that section size has on hardness. The illustrations showed the independence of chemical analysis on hardness where the rate of quench is sufficient. Where quench rate is fixed by the conditions, the size of section of course is of great significance.

The part played by alloying elements in the hardness story and the hardenability equation for predicting hardness values were referred to and the great value to the metallurgist of the Grossmann book on "Hardenability" was brought home to the audience.—**Reported by Irving H. Comroe for North Texas.**

New Films

Ultrasonic Inspection

A 10-min. sound color educational film describing the development, theory, operation and application of the Sperry ultrasonic reflectoscope for nondestructive testing of metals and other materials has just been released by Sperry Products, Inc. Prints of the film are available for showings to interested industry, trade and technical groups as well as technical and engineering societies, schools and colleges. Request information from: Sperry Products, Inc., Danbury, Conn.

Steel Spans the Chesapeake

Holding Power—the Story of Fasteners

Two new 16-mm. sound color motion pictures have been added to the Bethlehem Steel Co.'s industrial film library. The first, "Steel Spans the Chesapeake" is the story of the erection of the four-mile long Chesapeake Bay bridge. The showing time is 36 min. The second, "Holding Power—the Story of Fasteners", takes the audience behind the scenes in modern plants where bolts, nuts, rivets, spikes and special steel fasteners are manufactured. Showing time is 26 min.

Requests for prints should be sent directly to: Publications Dept., Bethlehem Steel Co., Bethlehem, Pa.

New Horizons in Aluminum Brazing

A new color movie which demonstrates the latest light-metal brazing techniques has been made by the Aluminum Co. of America. During the 22-min., 16-mm. sound film, Alcoa offers the viewer a comprehensive glimpse of the advantages that brazing provides in the design and fabrication of aluminum products. The film may be borrowed by requesting prints on a business letterhead from Aluminum Co. of America, Motion Picture Section, 854 Alcoa Bldg., Pittsburgh 19, Pa.

Whatever We Do

A 16-mm. color motion picture with sound, which has been produced by the Air Reduction Sales Co., is a basic documentary film about the atmospheric gases, oxygen, nitrogen, argon, helium and other rare gases, covering their key uses in industry and the numberless ways they appear in our daily lives as parts of familiar products. The film may be borrowed from any Air Reduction district office or by getting in touch with Air Reduction Sales Co., 60 East 42 St., New York 17, N. Y.

Wichita Tours Plant

The Wichita Chapter toured the plant of the O. A. Sutton Corp. at a recent meeting. The tour was taken by approximately 125 members of the Chapter and their guests. **—Reported by J. Ewert for Wichita.**

Austin Presents Scholarship at Milwaukee

From Left: Jerald L. Wuhrman, Metallurgical Engineering Senior at the University of Wisconsin, Is Shown Receiving an A.S.M. Foundation Scholarship Certificate From J. B. Austin, National President, While E. Gammeter, Chairman, Milwaukee Chapter, Looks on. (Milwaukee Journal Photo)

Speaker: J. B. Austin

U. S. Steel Corp.

The Milwaukee Chapter heard J. B. Austin, national president A.S.M. and director of research laboratories, U. S. Steel Corp., speak on "Magnification in Time in Metallurgical Operations" at a recent meeting.

By medium of slides and motion pictures, Dr. Austin described the techniques used with high-speed photography to illustrate such metallurgical operations as quenching, tapping of an openhearth, combustion zone in a blast furnace and various pressing and forging operations.

Dr. Austin presented a 25-year "Silver Jubilarian" membership certificate to the Wisconsin Electric Power Co. and he also presented an A.S.M. Foundation Scholarship to Jerald L. Wuhrman, co-captain of the University of Wisconsin's 1953 football team. Mr. Wuhrman was selected by the faculty as an outstanding senior student in metallurgical engineering at the University of Wisconsin.—**Reported by E. H. Schmidt for Milwaukee.**

Briton Seeks Contacts

William F. Chubb, a member of the International Chapter A.S.M., is planning to come to the United States to establish residence. He has enlisted the aid of the American Society for Metals in helping him to make contacts with the various metallurgical and technical concerns in the U. S., with the ultimate aim of taking out citizen's papers and remaining here permanently.

Dr. Chubb has a long record of academic and professional industrial qualifications. He holds B.Sc. and Ph.D. degrees from London University. From 1921 to 1924 he was chief assistant metallurgist for Lanston Monotype Corp., Ltd., England; from 1924-1930 chief metallurgist for the Moss Gear Co., Ltd., England; from 1930 to 1932 chief metallurgist for Ford Motor Co., Ltd., in Ireland; and from 1932 to 1935 was engaged in private metallurgical research on the thermal and electric conductivities of metals and alloys. He has served as consulting metallurgist for many years in England and in Turkey.

His teaching experience includes several years as lecturer in metallurgy in England and at Istanbul Technical University, Turkey, where he initiated the teaching of metallurgy in that country. From 1950 to 1953 he was at the University of Cairo, Egypt, organizing and developing a new department of metallurgy. He is the author of numerous papers on various metallurgical subjects.

Anyone interested in contacting Dr. Chubb should write to him as follows: W. F. Chubb, "Dunell", Glen Road, Raumati South, New Zealand.

Opens New Department

Metal Hydrides, Inc., producers of metallurgical and chemical hydrides, and metal and alloy powders, has announced the formation of a new metallurgical development department. It will be headed by Emanuel Gordon, Metal Hydrides' chief metallurgical engineer.

Nondestructive Testing Talk Draws Crowd at Jacksonville

A Record Attendance, Including Personnel Attending the Propeller Overhaul and Maintenance Conference at the Naval Air Station, and Representatives From Practically Every Class "A" Overhaul and Repair Department, Heard R. O. Schiebel, Jr., Discuss "Nondestructive Testing" at an A.S.M. Meeting in Jacksonville

Speaker: Roy O. Schiebel, Jr.
Magnaflux Corp.

"Scope of Nondestructive Testing in Industry Today" was the subject presented at a meeting of the Jacksonville Chapter by Roy O. Schiebel, Jr., Eastern District manager, Magnaflux Corp.

Mr. Schiebel spoke on methods for positive detection of defects in magnetic and nonmagnetic metals, ceramics, rubber products, etc., and emphasized the necessity of suitably trained personnel for inspection procedures in order to eliminate costly and perilous failures of equipment and materials. The importance of such a program of adequate inspection in the aircraft, automotive and railroad equipment industries was highly stressed by the speaker.

Mr. Schiebel interspersed his talk with slides depicting the various types of defects and a method of detection for each. He demonstrated the Sonizon, an ultrasonic measurement instrument for thickness measurements, and described the Magnaflux, Magnaglo, Zyglo, Statiflux, Partek, Spotchek and other nondestructive testing instruments.—**Reported by Walter S. Morris for Jacksonville.**

Radioactivity in Metallurgy Topic at Purdue Meeting

Speaker: H. J. Gomberg
Phoenix Project
University of Michigan

The Purdue Chapter was addressed by Henry J. Gomberg at a recent meeting. Dr. Gomberg, assistant director, Phoenix Project, University of Michigan, spoke on "Radioactive Tracers and Autoradiography in Metallurgy".

Technical chairman for the evening was Paul F. Chenea, department head of engineering mechanics at Purdue University and a former Colleague of Dr. Gomberg at the university of Michigan.

Dr. Gomberg began by discussing atomic structure and the difference between stable and radioactive atoms and how stable elements are changed to unstable elements by cyclotrons, betatrons, nuclear reactors, etc. Radioactivity was described and its use as a scientific tool discussed.

Dr. Gomberg next discussed autoradiography in metallurgy. There are two methods used in autoradiography, both of them utilizing photographic effects. These methods are referred to as "wet" and "dry". The advantages and disadvantages of both methods were discussed and a number of slides shown. Of particular interest was a slide of a microstructure showing nickel diffusion into steel along the austenitic grain boundary and no diffusion in what was thought to be ferritic grain boundaries in the same area.—**Reported by Leonard J. Ewalt for Purdue.**

Speaker Cites Types Of Abrasion and Ways Of Overcoming Them

Speaker: T. E. Norman
Climax Molybdenum Co.

The Rocky Mountain Chapter heard Telfer E. Norman, metallurgical engineer for Climax Molybdenum Co., speak on "Abrasion Resistant Materials for the Mining Industry" at a recent meeting.

Mr. Norman made reference to three general types of abrasion—scratching, gouging and stress.

The type of abrasion found on pump impellers or the impellers on flotation cells was cited as an example of scratching abrasion.

Gouging abrasion is much heavier. In this case, large particles are removed from the surface and it may be considered comparable to machining insofar as the degree of material removal. A typical example is the abrasion in a gyratory crusher.

The last type is stress abrasion such as found in a ball mill where the balls are striking hard rock and ore in which the force of the impact imparts stress abrasion to the grinding ball.

Mr. Norman gave an excellent discussion of the metallography of different types of materials which are used in various mining and milling operations to minimize abrasion.

By means of slides, he was able to show characteristic microstructures of materials which were particularly suited to certain types of abrasion.

Mr. Norman made the following recommendations: To resist scratching abrasion, high-chromium irons, which are expensive but outstanding, are best, and white iron and rubber are good. To resist gouging abrasion, manganese steels are good and a hard face overlay makes them more desirable as it reduces wear. Martensitic steels are good for high-stress abrasion or impact, and martensitic irons are good for medium-stress abrasion.—**Reported by Eugene Jiannetti for Rocky Mountain.**

Compliments

To ALAN H. COTTRELL, professor of physical metallurgy at the University of Birmingham, England, on receiving the Rosenhain Medal of the Institute of Metals in recognition of his outstanding contributions to knowledge in the field of physical metallurgy, with special reference to the deformation of metals.

♦ ♦ ♦

To ALFRED D. BEEKEN, JR., on his election as vice-president of Vulcan Crucible Steel Co., Aliquippa, Pa. Mr. Beeken, who has been with Vulcan since 1914, joined the A.S.M. in 1921, was Pittsburgh Chapter chairman in 1935, and worked on the toolsteel section of the Metals Handbook in 1936, 1939 and 1948.

Speaks on Uses of Electron Microscope

W. L. Grube (Right), Guest Speaker at a Detroit Chapter Meeting, Discusses a Field Emission Microscope With R. D. Chapman, Technical Chairman

Speaker: William Grube
General Motors Research Labs

In a joint meeting with the American Institute of Mining and Metallurgical Engineers in January the Detroit Chapter heard William Grube, supervisor of physics of solids section, physics instrumentation department, General Motors Research Laboratories, speak on "Applications of Electron Microscopy in Metallurgy".

Early attempts to use the electron microscope for the study of microstructures of metals were not too successful, as results obtained varied widely, chiefly because of the wide variety of techniques used. Interpretation of micrographs was extremely hazardous because the details seen at the high magnifications used were difficult to correlate with previous experience. Consequently, electron microscopy found only limited acceptance in the metallurgical field.

In 1948 a joint committee was formed for the specific purpose of investigating the possibilities of electron microscopy in studying the microstructure of steel. This committee maintains an active research program and its published results are ample evidence of the progress being made.

Three basic requirements must be satisfied in electron metallography. These are: Proper preparation of specimen; production of a faithful replica of the surface being examined; and correct interpretation of the resulting micrographs.

The polishing techniques used are essentially refinements of those employed in optical microscopy, and etchants are selected to accentuate relief between various constituents. Common etchants used include picral and activated nital solutions.

Replicas of the surface to be examined are generally one of three types, amorphous oxide films, plastics or metals. Plastic replicas are used most widely because of ease in preparation and interpretation. Shadow casting, in which a thin film of vaporized metal is deposited on the plastic, is used to increase contrast. Replicas are normally only 400 to 1000 angstroms thick.

In order to develop reliability and accuracy in interpretation of results, the first electron micrographs were compared with photomicrographs at high magnifications. By correlation of both methods, information has been obtained regarding such things as fine isothermal transformation products, grain boundary constituents, grain growth and subgrain structures in nonferrous metals, carbide growth, precipitation from solid solutions, slip due to plastic deformation and many other valuable bits of information to increase our knowledge of metals.

Mr. Grube demonstrated a field emission microscope at the conclusion of his talk.—**Reported by L. V. Marchetti and J. M. Herbenar for the Detroit Chapter.**

Baltimore Sponsoring Series On Constitution of Metals

The Baltimore Chapter has recently started its fifth annual educational lecture series. The course, on the "Constitution of Metals and Alloys", began on Feb. 27 and will continue for six consecutive Saturdays. Co-chairmen of the series are Howard L. Sittler, Arcrods Corp., and Paul A. Jennings, Rustless Division, Armco Steel Corp.—**Reported by Lewis H. Gross for Baltimore Chapter.**

Protective Coatings for Metals Subject in Akron

Speaker: A. R. Nasrallah
Goodyear Aircraft Corp.

The Akron Chapter heard A. R. Nasrallah, technical service department, Goodyear Aircraft Corp., speak on "Protective Coatings for Metals" at a meeting held recently.

The coffee speaker of the evening, J. J. Mosa, foreman of the Pierce and Draw Division, Babcock and Wilcox Co., presented an entertaining report on "Fishing".—**Reported by R. E. Miller for the Akron Chapter.**

ASM-AWS Hold Joint Meeting in Wichita

The Wichita Chapters of the American Society for Metals and the American Welding Society Heard Donald A. Sprowls of the Chemical-Metallurgy Division, Aluminum Co. of America, Speak on "Corrosion Aspects of Aluminum" Recently. Shown at the meeting are, from left: E. E. Van Meter, A.S.M. vice-chairman; R. E. Layton, A.S.M. chairman; Mr. Sprowls; Orville Daniels, A. W. S. chairman; and Joe Turner, chairman A.S.M. educational committee, Wichita Chapter. (Photograph by A. A. Melby)

French on Engineering Alloys at Boston

Herbert J. French, International Nickel Co., Inc., Spoke on "Engineering Alloy Steels" at a Recent Meeting in Boston. Shown are, from left: John Chipman, Massachusetts Institute of Technology; Walter B. Dennen, coffee speaker; Mr. French; and S.M. Baylor, chairman of the Boston Chapter A.S.M.

Speaker: Herbert J. French

International Nickel Co., Inc.

Engineering alloy steels have over the years made important contributions to improve standards of living and thereby have grown in scope and importance, Herbert J. French, vice-president, International Nickel Co., Inc., said in a talk before the Boston Chapter. Mr. French presented an illustrated address on "Engineering Alloy Steels and Their History and Uses Over the Past 50 years".

Much impetus to the study of the effect of individual alloying elements was given by the need for wartime conservation, with the result that modern alloy steels are aimed at the most economical use of combinations of alloys. Economy in use of alloys requires the cooperation of designers, fabricators and heat treaters, however.

Mr. French illustrated the importance of through hardening to obtain a fully martensitic structure in heat treated steels. Slack-quenched steels were shown to have generally inferior notched-bar properties, some compositions showing greater deterioration than others. Tests made on samples removed from production after the quenching operation in several industries showed that slack quenching represented U.S. practice in many of the cases investigated.

Mr. French also discussed the use of alloys in unhardened steels. Significant increases in strength are obtained through the use of alloys, while carbon content is kept low in order to maintain good fabricating characteristics. Special advantages, such as corrosion resistance, abrasion resistance and improved performance at high or low temperatures, may also be realized through the use of alloys.

Our present mastery over the mechanical properties of steels is relatively great, and different alloy combinations and treatments are used to provide wide ranges of strength, hardness and resistance to brittle fracture. Our ability to combat corrosion, abrasion, and the effects of sub-atmospheric or elevated temperatures is more restricted, while in the case of some properties, notably the elastic modulus of steels at ordinary temperatures, no measure of control is now available.

The coffee speaker, Walter B. Dennen, director, Worcester Boys' Trade High School, gave a talk lauding the efforts of A.S.M. in providing metals information at the vocational school level. He stated that fundamental metallurgical knowledge is beneficial, particularly to the welding, machining and drafting trades.—**Reported by R. A. Pomfret for Boston.**

Discusses Industrial Conference on Atomic Energy in Industry

Speaker: Ray McBrian

Denver & Rio Grande Western R. R.

A recent meeting of the Denver Section of the Rocky Mountain Chapter featured Ray McBrian, engineer of standards and research for the Denver and Rio Grande Western Railroad, who gave a report on the "National Industrial Conference Meeting on Atomic Energy in Industry".

Mr. McBrian attended this 3-day meeting in October. One of the days was spent touring the Brookhaven Laboratories in Long Island. In one of the areas visited extensive study of cancer of the brain was in progress. Radioactive boron compounds are being used for the treatment, and several terminal patients are being treated by this method. Although no one has been cured, the patients' lives have been extended in some cases and they have received considerable relief from pain.

The tour also included an inspection of reactors. The general classification of reactors as discussed at the meeting was given in Mr. McBrian's report. The point emphasized is the fact that the Atomic Energy Commission is inviting the participation of private companies in reactor power development. It is felt that in order to pursue the field of power production from atomic energy, private industry will have to bear much of the financial burden.

In addition to the tour, Mr. McBrian attended a technical symposium which was concerned primarily with the multitude of commercial uses for radioactive isotopes that have been developed and are being developed. Tracer techniques of all types have been put into use and inspection and quality control techniques utilizing radioactive isotopes are becoming more prevalent.

The possibility of the use of atomic energy to power automobiles and locomotives was also discussed. This point is of utmost concern to railroads because of its potentialities as a new source of power for the future. —**Reported by Eugene Jiannetti for the Rocky Mountain Chapter.**

Roberts Gives Toolsteels Lecture at Calumet Chapter

Speaker: George A. Roberts

Vanadium Alloys Steel Co.

The Calumet Chapter's National Officers' Night featured George A. Roberts, Vanadium-Alloys Steel Co. and vice-president A.S.M. He discussed "Toolsteels".

Mr. Roberts told of the development of toolsteel grades to meet specific requirements until around 100 different analyses are produced, about 75% of which are designed for special applications and may be disregarded in any general discussion of toolsteels. The remaining grades can be divided into seven groups; water hardening, shock resisting, oil hardening, air hardening, high carbon-high chromium, hot working and high speed steels. Of the 26 analyses falling into these various groups, a selection of 9 or 10 steels should provide sufficient coverage for any one user.

A discussion of hot hardness, toughness and wear resistance of the various high speed steels followed. Mr. Roberts described the effects of quenching and the variety of properties to be obtained by variations in tempering time and temperature. Microstructures, carbide composition, carbide hardness and grain size were discussed, and methods for determining mechanical properties related to toughness and ductility, including the bend test as a means of determining elastic limit, were described. Grain size measurements and heat treating factors influencing the growth of grains and precautions to be taken to minimize the occurrence of fish-scale fractures were also discussed. —**Reported by K. R. Hine for the Calumet Chapter.**

Aluminum Topic of Talk at Rochester

Present at a Meeting of Rochester Chapter Were, From Left: Gordon Chu and Harry Nickles, Who Were Honored at New Members Night; J. Hoffer, Vice-Chairman; E. H. Dix, Jr., Aluminum Co. of America, Who Spoke on "Aluminum in the Light Metal Age"; and B. Iannone, Chapter Photographer.

Machining Difficulties Explained in Buffalo

Speaker: Malcolm F. Judkins
Firth Sterling Inc.

The machinability of metals still defies our efforts to measure and catalog it, according to Malcolm F. Judkins, manager, New Products Division, Firth Sterling Inc., who spoke in Buffalo on "Machining".

Machining covers a large number of shaping operations which are similar only in that they all remove metal mechanically. There is often a difference in the mechanisms by which this is done.

A major advance in the understanding of machinability is the recent study of the role of friction. Tremendous frictional forces are built up as a chip slides across the cutting tool and these may result in chemical as well as metallurgical reactions. A recent study on this subject has shown that metal is actually molten at the instant it is cut.

Mr. Judkins went on to explain the anomalous behavior of titanium in the light of present knowledge of machinability. Though of relatively low hardness, titanium can destroy a high carbon steel drill in a short time. Titanium is very reactive at elevated temperatures, and the heat generated in the cutting operation allows it to alloy with the drill much more readily than will other metals. This same explanation applies to the poor grinding characteristics of titanium. It reduces the oxide particles of the grinding wheel, resulting in excessive wheel wear.

The new synthetic cutting fluids have proved to be of great value in machining titanium. They lower cutting temperatures, thereby decreasing the rate of chemical reactions.

Mr. Judkins stated that the machinability of a metal must take into account its microstructure.—**Reported by A. E. Leach for Buffalo.**

Speaker: E. H. Dix, Jr.
Aluminum Co. of America

"Aluminum in the Light Metal Age" was the topic discussed by E. H. Dix, Jr., assistant director of research, Aluminum Co. of America, at a recent meeting of the Rochester Chapter.

The talk commenced with a definition of a light metal. The specific gravity of aluminum (2.7) was compared with the specific gravity of magnesium (1.7) and titanium (4.5). Statistics regarding producer tonnage and consumer usage were presented, and from these the rapid expansion of the aluminum industry in the past and the sustained increases in production were noted.

Mr. Dix pointed out that a variety of properties such as light weight, high strength/weight ratio, high electrical and thermal conductivity, good resistance to corrosion, pleasing appearance, high reflectivity, good workability and, above all, low cost, could be obtained in aluminum alloys. They are also nonmagnetic, nontoxic and nonsparking.

In describing the specific properties obtainable from the aluminum family, the speaker limited himself to the nonheat-treatable wrought alloys. Pertinent points brought out were as follows:

The yield strength at nearly 1000 psi. intervals can be obtained in the annealed temper by alloy selection; compositions containing around 5% magnesium and greater are susceptible to stress corrosion cracking under some conditions of cold work and use; A54S and XC56S alloys, from which can be obtained high strength-high ductility welds, are now being used in tank and marine applications; the effect of small amounts of undissolved constituents in 99.3% pure aluminum will darken aluminum upon anodizing, whereas 99.99% pure aluminum with little or no undissolved constituents will remain clear and bright; and powder metallurgy compacts, now in the experimental stage, of pure aluminum with oxide as dispersant have been treated as an ingot from which wrought forms have been produced. Such parts have strength properties at temperatures above about 600° F., considerably higher than can be obtained in aluminum alloys produced by conventional methods.

During the meeting, which was "New Members Night", special recognition was given to all members who had joined the Chapter during the past year by the Chapter's officers.—**Reported by Sydney Gamlen for the Rochester Chapter.**

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1955 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 36th National Metal Congress and Exposition to be held in Chicago, Nov. 1-5, 1954, and the Western Metal Congress, Los Angeles, May 21-25, 1955. Papers that are selected for presentation will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 10, 1954.

Acceptance of a paper for publication does not necessarily infer that it will be presented. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

FURNACE EXECUTIVES ENJOY IFMA'S MEETING

Philadelphia, January 26—Annual two-day meeting of the Industrial Furnace Manufacturers Association was concluded here today.

Election of new directors and officers featured the meeting. Three new directors were elected—Norman Davies of North American Manufacturing Co.; Horace Drever of Drever Co.; and L. H. Gillette of Westinghouse Electric Corp.

Mr. Gillette was elected president of the Association, to succeed Curt H. Vaughan of Electric Furace Co. Mr. Drever was elected vice-president of the Association. Ralph E. Whittaker of Swindell-Dressler Corp. will continue as treasurer.

"Modernization" was the theme of the meeting with extensive discussion of the increased industrial efficiency that is made possible with modern furnace equipment.

(Photographs, courtesy I. Stanley Wishoski.)

From Left Are: Walter Holcroft, Holcroft & Co.; A. L. Hollinger and H. M. Heyn, Surface Combustion Corp.; L. R. Foote, Bryant Industrial Products Corp.; and A. E. Tarr of Leeds & Northrup

J. B. Carey of A. F. Holden Co.; John Patterson, Public Relations Counsellor, I.F.M.A.; K. U. Wirtz, of the Electric Furnace Co.; D. H. Gardner and L. W. Prestin of Sunbeam Corp.

I.F.M.A. Officers Include, From Left: T. F. Sheckels, Secretary, Curt H. Vaughn, Past-President; A. L. Hollinger; Carl L. Ipsen, Executive Vice-President; L. H. Gillette, President, L. A. Shea; Ralph E. Whittaker, Treasurer; Horace Drever, Vice-President

Among Furnacemen in Attendance, Shown on the Opposite Page, Are: (Top From Left) C. W. Hanlon, Hauck Mfg. Co.; J. W. Moore and W. H. Brown, Hoskins Mfg. Co.; A. Pereny, Pereny Equipment Co.; W. H. Boyd, Gas Atmospheres, Inc.; E. E. Staples, Hevi Duty Electric Co.; C. F. Olmstead, Lee Wilson Eng. Co. (Center) J. H. Sands and A. D. Wilcox, Eclipse Fuel Eng. Co.; L. R. Foote, Bryant Industrial Products Corp. (Bottom) R. Whittaker, Swindell-Dressler Corp.; H. Koch, Hevi Duty Electric Co.; C. H. Vaughn, Electric Furnace Co.; A. L. Hollinger, Surface Combustion Corp.; W. Holcroft, Holcroft & Co.; C. W. Tall, Jr., Leeds & Northrup Co.; G. McCormick, Industrial Heating Equipment Co.; and H. M. Heyn, Surface Combustion Corp.

Meet Your Chapter Chairman

T. E. Olson

R. B. Boswell

G. S. Fergin

DETROIT

THEODORE E. OLSON, engineering representative for the Tocco Division of the Ohio Crankshaft Co., was born in Minneapolis, Minn. He attended the University of Minnesota, where he graduated with a B.S. degree in metallurgy. After leaving school he was employed as project engineer in the metallurgical department of the Chrysler Engineering Division of the Chrysler Corp., and while there, he furthered his studies at Chrysler Institute of Engineering, attaining an M.S. degree in automotive engineering. After he left Chrysler he became associated with the Ohio Crankshaft Co.

He is a member of the Engineering Society of Detroit and the Society of Automotive Engineers. He has been a member of the A.S.M. since 1938 and over the years has been active on various local committees, and chairman of the educational and yearbook committees. He has always given freely of his time and energy in promoting A.S.M. activities.

He is married and has two children. His hobbies are golf and photography.

NEW ORLEANS

R. B. BOSWELL, chief metallurgist at the Chrysler Tank Division, was born in Washington, D. C., and educated at elementary and high schools in Utica, N. Y. He received his B.S. in metallurgical engineering from the University of Michigan in 1942. After college he went directly into the Navy where, after indoctrination, he was assigned to the Bureau of Ordnance in Washington as a metallurgist in the research and development division. He was transferred to the armor and projectile laboratory at the Proving Grounds in Dahlgren, Va., in 1944, where he worked on development of aircraft-type armor plate. In 1946 he joined the metallurgical research department of the Central Engineering Division at Chrysler as a research metallurgist, and from 1947 to 1950 he was an evening school instructor in physical metallurgy at Wayne University.

Mr. Boswell is married and he and his wife have three boys, ages 9, 8 and 8 months. He served on various committees for the Detroit Chapter from 1947 to 1951, and aided in organizing and founding the New Orleans Chapter. His time is largely devoted to his family with bowling, golf (in the 90's), colored movies and fishing running close seconds in interest.

INLAND EMPIRE

G. STANLEY FERGIN is a native Washingtonian and was graduated from the State College of Washington in 1949 with a degree in metallurgy. He joined the metallurgical research division of the Kaiser Aluminum & Chemical Corp., Spokane, where he was engaged in fume control development. After two years he transferred to the Mead Reduction Plant where he worked as development engineer for over a year. He is now production engineer for four of the eight potlines at the Mead Plant.

Stan is a member of the Spokane A.I.M.E. chapter, is in the choir at St. John's Episcopal Cathedral, and is a member of the Sigma Nu Fraternity. He has been a member of the Inland Empire Chapter A.S.M. for five years, and has served on the executive committee and as program chairman.

Stan's wife, Joan, is a native of Spokane and attended the same college with him. They have a 9-month old son, Gregory. Stan enjoys woodworking and photography in his spare time.

OAK RIDGE

WILLIAM D. MANLY, metallurgist at Oak Ridge National Laboratory, is engaged in research on high-temperature materials problems in atomic energy work. He was born in Malta, O., in 1923, and attended public schools in Malta and McConnelsville, Ohio. He received his B.S. degree from Antioch College, his M.S. degree from the University of Notre Dame, and is presently attending the University of Tennessee, working toward his Ph.D.

Bill is married and has two sons and a daughter. He likes to hunt, fish and do photographic work in his spare time. He was active in football and wrestling during his undergraduate years at school. He served in the U. S. Marine Corps during the war and saw duty in the South Pacific and China as a motor transport maintenance officer. Bill is a member of the National Association of Corrosion Engineers and the American Institute of Mining and Metallurgical Engineers, and has served on the AS.M.'s Publications Committee. He was vice-chairman of the Oak Ridge Chapter's executive committee during 1951-1952.

LOUISVILLE

HAROLD J. SMITH, assistant works metallurgist at International Harvester Co., was born in Fairmont, W. Va., in 1916 and attended grade and high school in that city. He received an A.B. degree in chemistry and physics from Fairmont State College in 1937 and the day following graduation took a job as analyst in Fairmont Aluminum Co.'s laboratories.

Harold married Miss Helen Hoey in 1938 and he and his wife have a daughter, Prudy, age 11. He studied on an after-hour basis in the metallurgical department of West Virginia University during 1939 and 1940, while continuing to work at Fairmont Aluminum as chief chemist, assistant plant metallurgist and for a year as plant metallurgist. He went to Louisville in 1943 with Tube Turns, Inc., and in 1946 took a job as chief chemist at the farm tractor plant of

J. A. Dlouhy

W. D. Manly

H. J. Smith

International Harvester, where he has been since.

In college, Harold served as manager of the football team, president of his fraternity, and president of the junior class and Student Body. He has been a member of Kiwanis since 1943 and has served as secretary, vice-president, president and lieutenant governor of the Ky.-Tenn. District of Kiwanis International. He was recently appointed to the A.S.M. National Educational Committee.

Harold is an elder in the Presbyterian Church and has been superintendent of the Sunday School and chairman of various committees. He is also interested in civic activities, and for relaxation enjoys manual and mechanical art activities.

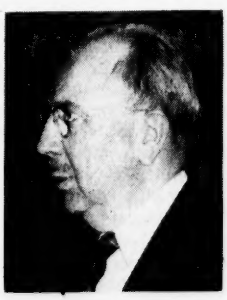
MICHIGAN COLLEGE OF MINING & TECHNOLOGY

JOHN A. DLOUHY, chairman of the student chapter at Michigan College of Mining and Technology, was born in Oak Park, Ill., in 1928. He attends Michigan Tech where he is a letterman on the varsity track team. He worked four years at Argonne National Laboratory in the metallurgy division.

John, who is not married, classes photography and sailboating as his chief hobbies. He is a member of the Theta Tau Fraternity and the Camera Club, and is the photographic editor of the college yearbook and college newspaper.

BOSTON

SIDNEY H. BAYLOR, vice-president of the Eastern Appliance Co., was born in Boston. He attended Berkshire School in Sheffield, Mass., and Massachusetts Institute of Technology. His first job out of school was as junior engineer on public service in Colorado, and later jobs were in



S. H. Baylor

laboratory and sales work for industrial furnace manufacturers.

Sidney is married and has two children. He belongs to the New England Gas Association, has been a member of the Executive Committee of the Boston Chapter A.S.M. since 1944, and has served as national treasurer of Theta Chi Fraternity. He is presently using all his spare time to remodel an old farm in Vermont. Sidney was in the 101st Field Artillery during World War I.

Cites Relation of Metallurgy to Design

H. R. Neifert, Timken Roller Bearing Co., Gave a Talk on the "Relation of Metallurgy to Design" Before the Rochester Chapter. Shown after the meeting are, from left: R. S. Guinan, Consolidated Vacuum Corp., chairman; Mr. Neifert; F. M. Dale, the Chapter's first chairman (1920-21) and president of the Rochester Machine Screw Co.; and John J. Hoffer, of Eastman Kodak Co., program committeeman. (Photograph by N. Iannone)

Speaker: H. R. Neifert

Timken Roller Bearing Co.

"Relation of Metallurgy to Design" was discussed by H. R. Neifert of the engineering and research staff, Timken Roller Bearing Co., in Rochester.

Mr. Neifert discussed the effect of factors such as basic properties, design, size effect and quality rating of the material on one phase of design--the fatigue strength of a part. The main point made was that ideally the designer cannot truly rely upon fatigue strength data based on a small specimen but should resort to test data obtained from the actual part under consideration. Numerous test data based on the speaker's experience with railroad car axles were presented to confirm this point. From these data evolved the following.

1. Internal stresses in the proper direction can enhance fatigue strength. In this respect, peening or cold rolling or heat treatment can be used to aid, whereas cold work from straightening will reduce fatigue strength. A railroad car axle was shown where a 200% increase in fatigue strength resulted from surface cold rolling of the wheel seat.

2. Relief grooves of proper depth and radius machined adjacent to a fitted member improve the fatigue strength in the region of the fit.

3. The use of proper allowable stress values which take into account processing conditions, size effect and material inhomogeneities will alleviate the danger of fatigue failure in any machine part.

This meeting, which was designated Past Chairmen's Night, honored the Chapter's past chairmen. Model gavels were presented to each as a token of appreciation. Of the 34 past chairmen since the Chapter's origin in 1920, 20 attended the meeting, including the first, F. M. Dale.—**Reported by Sydney Gamlen for Rochester.**

French Societies Schedule Aluminum Congress for June

L'Aluminium Francais and La Societe Chimique de France have announced that they will hold a scientific Congress and Exposition in Paris, France, from June 14 through 19, 1954, to celebrate the centenary of the first production of industrial aluminum in France by Henry St-Claire Deville.

The activities of the Congress will consist of papers on aluminum metallurgy, the chemistry and physicochemistry of aluminum compounds, and the technology and uses of aluminum and aluminum alloys. An exhibition of aluminum and aluminum products, prepared by L'Aluminium Francais, will be held on the Seine embankment in Paris at the same time.

Final programs and further information may be obtained by writing to: R. Gadeau, Secretary, L'Aluminium Francais, 223 Rue Balzac, Paris (8e) France.

FBI Agent Gives Talk at Peoria

Speaker: William C. Ritt

Federal Bureau of Investigation

William C. Ritt, special agent of the F.B.I., Peoria area, was the guest speaker at a meeting of the Peoria Chapter.

Mr. Ritt gave a history of federal investigational functions prior to and after the founding of the Bureau in 1924. He described the divisions, scope and duties of his organization, illustrating his talk with some specific examples from past case histories.—**Reported by W. O. Kaarlela for Peoria.**

Payson Talks on Hardenability at Texas

"Hardenability of Steels" Was the Subject of a Talk Given by Peter Payson, Assistant Director of Research, Crucible Steel Co., Before a Meeting of the Texas Chapter. Shown are, from left: Arthur R. Oakley, Jr., vice-chairman; Mr. Payson; and W. Mack Crook, chairman. (Photo by L. V. Dolan)

Speaker: Peter Payson

Crucible Steel Co.

Peter Payson, assistant director of research for the Crucible Steel Co., spoke to 91 members and guests of the Texas Chapter on the "Hardenability of Steels" recently.

Mr. Payson's lecture was confined mainly to descriptions of the various methods of determining the hardenabilities of steels and the reasons for wanting to know the hardenabilities. Among the several slides shown, one listed the following reasons for interest in hardenability:

1. Need for high hardness at the center of large sections.
2. Need for best mechanical properties in large sections.
3. Need to minimize distortion in hardening.
4. Need to avoid cracking in hardening small sections.

The hardness attained depends on many factors, the most important being the size and shape of the piece quenched and the rate of cooling. The transformation of austenite controls the hardenability of the steel and the variations in carbon and alloy content control the transformation temperatures.

Grossmann's "Calculation of Ideal Critical Diameter From Chemical Composition and Grain Size" was explained by Mr. Payson. In this method a steel is assumed to have a base hardenability due to its carbon content and grain size. The effect of alloy additions on base hardenability is obtained by applying multiplying factors for each element present so that the product of those factors and the base factor for carbon and grain size results in the D_1 value for the steel. The bar of ideal diameter will harden so that the center structure will be 50% martensite.

The Jominy end quench method was described, and slides were shown on H-bands for several steels. The usual method of ordering steels to specified H-bands was also explained. Mr. Payson described the Shepherd PF test, which is generally accepted for high carbon, low hardenability steels, and the Shepherd PV test for such steels. **—Reported by Joe B. Marx for Texas.**

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-17, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

Shows How Optimum Dew Point Can Be Determined

Speaker: Edward J. Pavesic

Lindberg Steel Treating Co.

"The Effect of Dew Point in an Endothermic Furnace Atmosphere Upon Carbon Potential" was the subject discussed for the Worcester Chapter by Edward J. Pavesic, director of research, Lindberg Steel Treating Co.

The equilibrium relationships between various steels and the dew point of an endothermic atmosphere were clearly presented by the speaker in a series of slides. The curves showed that it is possible to determine the optimum dew point necessary to maintain steel equilibrium at various heat treating temperatures. Thus, for any given steel, one can predict the proper dew point for maintaining equilibrium at the heat treat temperature involved.

Mr. Pavesic also discussed quality heat treating methods and the failures resulting from improper practices. Correct heating rates and soaking times, quenching procedures, tempering and straightening practices were explained. Mr. Pavesic stated that the development of the endothermic generator to produce an inexpensive atmosphere brought much improvement in the quality of heat treated parts.—**Reported by Lester Stern for the Worcester Chapter.**

Va. Tech Chapter Hears Talk on the Mining and Smelting of Copper

Speaker: Ira T. Hook

American Brass Co.

Ira T. Hook, research engineer for the American Brass Co., presented a lecture entitled "Copper Mining and Extracting" at a meeting of the Virginia Tech Chapter.

Mr. Hook pointed out that mining of a lean ore was first started at Bingham Canyon, Utah, in 1911. Until that time, ore with a tenor less than 7% was discarded. However, it was found that by extracting a large volume of the lean ore, a profit was obtainable. Today, some of our leading mines extract as much as 90,000 tons of ore each day.

At the copper mine near Butte, Mont., the rules for economic extraction are hard to cope with, due to the huge quantities of totally barren rock which must be extracted to reach the ore, but much of the extra cost is avoided by use of selective mining in conjunction with blockcaving.

Butte hill, "the richest hill on earth" was formed by tremendous natural pressures which cracked the earth's crust and caused an upheaval of copper, iron and silver sulphides into these cracks. Geologists at Butte are constantly taking samples to aid the plotting of a good map of the deposit. A composite picture of the ore-bearing samples reveals the deposit to be roughly ellipsoidal in shape with an approximate copper content in the range of 1 to 2%.

In places where the ore is close to the surface it has become oxidized by exposure to rainwater. These oxides of copper are easily reduced by their reaction with carbon monoxide in a simple furnace, or, the metal is leached from the ore by dilute sulphuric acid and then electroplated from the solution.

In such ores the lower occurring sulphides must be oxidized. In this process, loss of precious tons of copper oxide is prevented by taking the slag back to the furnace where the sulphide gases reduce the copper oxide.—**Reported by E. V. van Reuth for the Virginia Tech Chapter.**

Abrasion Resistant Alloys Discussed at Notre Dame

Speaker: Howard S. Avery
American Brake Shoe Co.

Howard S. Avery, research metallurgist, American Brake Shoe Co., gave a talk entitled "Abrasion Resistant Alloys" at a meeting at Notre Dame.

Mr. Avery stated that abrasion tests are nonstandard, and his company has designed their own testing equipment for abrasion tests. Types of abrasion may be classified as gouging, crushing, erosion and low-stress.

Factors to be considered in selecting an alloy to function properly are hardness, impact, abrasion, hot wear, corrosion and friction.

Slides were shown by the speaker giving data and applications of the various alloys available to date.—**Reported by R. C. Pocock for the Notre Dame Chapter.**

Birmingham Chapter Holds Joint Meeting With A. W. S.

Speaker: William S. Pellini
Naval Research Laboratory

The Birmingham Chapter held a joint meeting with the local chapter of the American Welding Society recently. Attendance was very good and the members of both societies enjoyed the opportunity of meeting together and discussing matters of common interest.

Guest speaker for the evening, William S. Pellini of the Naval Research Laboratory, Washington, D. C., discussed "Weldability as a Metallurgical Problem". The subject was well presented and many useful and interesting points were brought out by the speaker.—**Reported by Walton P. McCord for the Birmingham Chapter.**

Doehler Award to Be Made for Die Casting Papers

The Doehler Award of the American Die Casting Institute for outstanding contributions to the advancement of the die casting industry and process has recently been announced. The Award, which is made annually, will consist of a suitable plaque and a cash honorarium of at least $500, or more if the income of the Fund set up for the Award permits and at the discretion of the Award Committee.

Any individual, group of individuals, educational institution, technical or scientific society is eligible to present papers and projects on technical advancements, advancements in plant operations or other activities. The projects will be evaluated on the applicability of their contribution to the die casting industry.

Nominations for the Award and supporting papers or other material should be sent prior to April 15 to: Award Committee, American Die Casting Institute, 366 Madison Ave., New York 17. Further information about the Award can be obtained at the same address.

Open Business Fellowships To Colorado Graduates

Establishment of a fellowship designed to produce future leaders for the mineral industries with both engineering and business adminstration backgrounds has been announced jointly by John W. Vanderwilt, president of Colorado School of Mines, and Donald K. David, dean of the Harvard Business School.

The graduate who is awarded the fellowship will be enrolled annually in a two-year course leading to a master's degree in business administration. He will receive a grant-in-aid of $1500 each year.

Any Mines graduate may apply for the Mineral Engineering Fellowship providing he has had at least two years working experience in mineral engineering, either before or after graduation. Applicants should write to the Harvard Business School, Boston 63, Mass.

Austin Speaks Before New York Chapter

James B. Austin, A.S.M. National President, Discussed "Magnification in Time" at a Meeting of the New York Chapter Recently. A film entitled "Magnifying Time" was also shown, and Dr. Austin presented news from national headquarters. Shown are, from left: Neal Russell, chapter chairman; Dr. Austin; and Harold K. Work, technical chairman of the meeting

Wichita Hears Discussion on Titanium

Shown at a Meeting in Wichita Are, From Left: Robert E. Layton, Chairman; Arvid A. Melby, Treasurer; R. S. Nycum, Titanium Metals Corp., Who Spoke on "Titanium and Its Uses"; and E. Van Meter, Vice-Chairman (Reported by Jonathan Ewert for Wichita: Photograph by A. A. Melby)

New Orleans Holds Course on Corrosion of Metals

Attending One of the Three Lectures in the Educational Series on the "Corrosion of Metals", Presented by the New Orleans Chapter at Tulane University, Is a Large Group of Men From the New Orleans Area

New Orleans Chapter held its 1953 Fall Education Series at Tulane University. The subject of the series was "Corrosion of Metals" and was composed of three lectures with the following speakers and topics of discussion:

1—R. A. Fitch of Gulf Oil Corp. Mr. Fitch is chief fuels and lubricants engineer, metallurgical section, industrial products engineering in the Pittsburgh general office. He spoke on "Basic Principles of Metallic Corrosion", in which he discussed direct chemical attack, electrolytic corrosion by oxygen depolarization and hydrogen evolution, and key factors in iron and zinc corrosion under commonly met conditions.

2—L. H. Frew, staff engineer, lubricants department, New York office, Shell Oil Co., spoke on "Effect of Composition and Environment on Corrosion of Iron and Steel". Mr. Frew discussed the effects of metallic coatings, protective rust films, different atmospheres and alloying elements on atmospheric corrosion, and corrosion in fresh water, sea water and soils.

3—E. Wayne Everhart, chief of the corrosion laboratory, division of metallurgical research, Trentwood Works in Spokane, Wash., Kaiser Aluminum & Chemical Corp., spoke on "Corrosion of Light Metals (Aluminum and Magnesium)". He discussed protective surface films, the electrochemical mechanism of corrosion, sources of corrosion data, aluminum and magnesium and their alloys, chemical corrosion and methods of protection against corrosion.

The program chairman for the educational series was L. H. Yount of Chrysler Corp. There were 146 registrants for the lecture series, representing 38 companies in the New Orleans area.—**Reported by Paul K. Raiford for the New Orleans Chapter.**

Corrosion Is Subject of Lecture in Wichita

Speaker: George Fisher

International Nickel Co.

A meeting of the Wichita Chapter featured a talk by George Fisher, technical representative for the International Nickel Co., on the subject "Corrosion in Action". Supplementing his talk with a film on corrosion, Mr. Fisher explained how corrosive action occurs and what can be done to stop it.—**Reported by J. Ewert for the Wichita Chapter.**

How Steel Is Affected by Oxidation and Carburizing

Speaker: Harry K. Ihrig

Allis-Chalmers Manufacturing Co.

The Notre Dame Chapter heard Harry K. Ihrig of Allis-Chalmers Manufacturing Co., speak on "Corrosion of Steels at High Temperatures Under Alternating Oxidizing and Carburizing Conditions".

Dr. Ihrig has worked on many research problems during his career and he drew on this experience to acquaint his audience with the factors involved in the choice of a steel suitable for use under alternating oxidizing and carburizing conditions. The particular examples used were the catalyst-packed tubes used in the processing of high-octane gas and the synthesizing of butadiene for manufacturing synthetic rubber.

Dr. Ihrig answered questions on his patented process for the production of a high-silicon case on low-carbon steels. This process gives a wear resistant, nongalling surface which has proven especially beneficial for such applications as pump shafts.—**Reported by R. C. Pocock for Notre Dame.**

Discusses New Presses at Worcester

Present at a Recent Meeting of the New Orleans Chapter Were, From Left: L. H. Yount, Chrysler Corp., Program Chairman; James McElgin, E. F. Houghton & Co., Guest Speaker; R. B. Boswell, Chrysler Corp., Chapter Chairman; and Robert Whitman, Tulane University, Who Was Coffee Speaker

Speaker: James McElgin
E. F. Houghton & Co.

"Liquid Salt Bath Heat Treatment of Metals" was the subject of a talk given by James McElgin, manager of the metalworking department, E. F. Houghton and Co., at a meeting of the New Orleans Chapter.

Mr. McElgin discussed the reasons for employing a liquid salt bath for heating purposes in the treatment of metals. Among the reasons were rapid and uniform heating, elimination of scale and decarburization, reduced cracking and distortion, cleanliness of work, speed-up and uniformity of production and lower production costs.

Mr. McElgin discussed classifications of furnaces, application to ferrous and nonferrous metals, types of salt baths, quenching in molten salt bath and comparison of heat treatment processes. With the aid of slides, the speaker pointed out to the group the advantageous results in the properties of metals through the use of liquid salt baths.

He stated that for improved machinability, the procedure known today as cyclic annealing is commanding attention. Cyclic annealing is based on the use of "S" or time-temperature curves of the particular steel being used. Practical application of cyclic annealing consists of quenching the part after heating to above the austenitizing temperature into a molten salt bath operating at a temperature below the lower critical and above the nose of the "S" curve. Parts are held in the molten bath for the period of time indicated by the isothermal curve for completion of the transformation. Cooling is then completed in the most convenient manner. This treatment produces a uniform coarse pearlitic structure which is readily machinable. It is comparable to the results from furnace annealing, but saves considerable time in production.—**Reported by P. K. Raiford for the New Orleans Chapter.**

Lower Lakes Regional Conference Planned

The second annual Lower Lakes Regional Conference, sponsored jointly by the Buffalo, Ontario, Southern Tier, Northwest Pennsylvania, Rochester, Syracuse, Rome and Western Ontario Chapters of the American Society for Metals, will be held at the Hotel Seneca, Rochester, N. Y., from April 22 through April 24, 1954, with the Rochester Chapter acting as host. The theme of the conference will be "Advances in Metal Processing".

Registration, technical sessions, plant visits to the Pfaudler Co., and the Camera Works, Eastman Kodak Co., a reception and dinner will be held during the first day. The second day will feature technical sessions, visits to the Taylor Instrument Cos. and the Rochester Products Division of General Motors Corp. An inspection tour of the Genesee Brewing Co. will follow the evening's reception and dinner.

The third day of the conference will feature technical sessions through noon, and a dinner dance in the evening. A special program is planned for the ladies.

Technical subjects to be covered during the Conference will include: Selecting the Right Material; Standardizing to Reduce Costs; Coordination Between Process Engineer and Metallurgist; Quality Improvement of Materials by Radiographic Inspection; Modern Processing of Materials for High-Temperature Application; Testing Helps Conserve Materials; Processing Powder Metal Parts for Specific Engineering Properties; Powder Metallurgy, Past-Present and Future; Powder Metals, Carbides and Metal-Nonmetal Combinations; Trends in Heat Processing Equipment; Advances in Metal Processing by Carburizing; and Aircraft Construction Materials.

National President James B. Austin, director of research laboratories, United States Steel Corp., will speak at the first dinner meeting.

J. J. Hoffer, Hawk-Eye Works, Eastman Kodak Co., Rochester, is program chairman.

Lindberg Expands

The Lindberg Engineering Co., Chicago, has announced the formation of Efco-Lindberg Ltd., with headquarters in Montreal, and branches throughout the Dominion of Canada. This company will combine the resources of Lindberg, the Electric Furnace Co. of England and Williams & Wilson, Ltd. of Canada.

Toolsteels Discussed at Worcester

Stewart G. Fletcher, Chief Metallurgist of Latrobe Steel Co., Discussed "Toolsteels" at the December Meeting of the Worcester Chapter. Shown are, from left: Harold J. Elmendorf, American Steel & Wire Co., chapter chairman; Mr. Fletcher; and J. C. Danec, Norton Behr-Manning Overseas, Inc., technical chairman. (Reported by C. W. Russell for Worcester)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Apr. 21	Mayflower Hotel	W. H. Eisenman	A.S.M.—A World-Wide Organization
Baltimore	Apr. 19	Engineers Club	C. T. Evans, Jr.	High-Temperature Metallurgy
Boston	Apr. 2	Hotel Shelton	J. C. Hodge	Sauveur Memorial Night
British Columbia	Apr. 12	Stanley Park	C. Robinson	Recent Developments in Welding
Buffalo	Apr. 8	Sheraton Hotel	R. D. Heidenreich	Electron Microscopy
Calumet	Apr. 13	Phil Smidt's		Words on Waves—Ladies Night
Canton-Massillon	Apr. 6	Mergus Restaurant	R. L. Mattson	Residual Stresses
Carolinas	Apr. 15	Winston-Salem	Charles Brown	New Welding Procedures
Cedar Rapids	Apr. 13	Roosevelt Hotel	Muir Frey	Case Hardening and Surface Hardening
Chicago	Apr. 24	Svithiod Singing Club		Annual Dance
Cincinnati	Apr. 1	Eng. Soc. Hqrts.		Tri-Chapter Meeting With Columbus and Dayton
Cleveland	Apr. 5	Hollenden Hotel	T. W. Lippert	Titanium and Zirconium
Columbia Basin	Apr.		C. Robinson	Recent Developments in Welding
Columbus	Apr. 1	Cincinnati		Tri-Chapter Meeting
Dayton	Apr. 1	Cincinnati		Tri-Chapter Meeting
Detroit	Apr. 12	Rackham Memorial Bldg.	I. Harter, Jr., and T. W. Radcliffe	Continuous Casting of Steel
Eastern New York	Apr. 13	Panetta's Restaurant	H. F. Taylor	Casting of Metals
Fort Wayne	Apr. 12	Howard Johnsons'	H. O. Vogel	Patent Applications
Golden Gate	Apr. 12	El Curtola	J. D. Graham	Service Failures
Hartford	Apr. 13	Indian Hills Country Club	W. J. Gulliksen	Forming of Titanium
Indianapolis	Apr. 19	McClarney's Rest.	D. A. Cargill	Shot Peening and Cleaning Nonferrous Parts
Jacksonville	Apr. 12	Seminole Hotel		Dy-Check, the Nondestructive Testing Method Procedure
Kansas City	Apr. 19	Fred Harvey's	H. N. Staats	Inspection Problems
Lehigh Valley	Apr. 2	Hotel Traylor	C. Allen	Fabrication and Used Stainless Steel
Los Alamos	Apr. 15		T. F. McCormick	Extrusion of Metals
Louisville	Apr. 6	5 and 1 Club	W. d'Orville Doty	Metallurgy of Welding
Mahoning Valley	Apr. 13	V.F.W.	Howard Wolf	Cold Forming of Steel
Milwaukee	Apr. 20	City Club	J. J. B. Rutherford	New Phases in Hot Working of Metals
Minnesota	Apr. 15	St. Paul		Plant Tour, American Hoist and Derrick Co.
Montreal	Apr. 5	Queens Hotel	H. S. Avery	Hard Surfacing Alloys
New Haven	Apr. 15	Hotel Taft	J. B. Austin	Metals of Tomorrow
New Jersey	Apr. 19	Essex House	Panel	Metal Powders, Cermets and Ceramic Coatings
New York	Apr. 12	Schwartz's Restaurant	Panel	Physical Metallurgy Problems in Welding
North Texas	Apr.	Engineers Club	T. W. Lippert	Titanium—Its Application and Properties
Notre Dame	Apr. 14	Engineering Bldg.	A. J. Thomas	Quality Control
Oak Ridge	Apr. 21	K. of C. Hall	B. H. Alexander	Diffusion
Ontario	Apr. 2	St. Catherine	G. Olson	Continuous Steel Casting Process
Oregon	Apr.	Congress Hotel	C. Robinson	Recent Developments in Welding
Ottawa Valley	Apr. 6	P.M.R.L.	A. S. Mitchell	Industrial Applications of Electroplating
Penn State	Apr. 6	Elec. Eng. Bldg.	R. B. Mears	Generalized Theory of Stress Corrosion Cracking
Peoria	Apr. 12	New American Legion Bldg., Norton, Ill.	J. B. Austin	Magnification in Time
Philadelphia	Apr. 30	Engineers Club	E. N. Skinner	High-Temperature Alloys
Jr. Section	Apr. 9	Engineers Club	W. Schulte	Hot Extrusion of Steel
Pittsburgh	Apr. 8	Ft. Pitt Hotel	J. J. Fagan	Rockets and Guided Missiles
Purdue	Apr. 24	Purdue Memorial Union	C. Lipson, E. S. Rowland and R. L. Mattson	Indiana State Symposium
Rhode Island	Apr. 7	Eng. Soc. Bldg.	Symposium	Heat Treating Methods
Rochester	Apr. 22-24	Hotel Seneca, Rochester		Lower Lakes Regional Conference
Rockford	Apr. 28	Faust Hotel	F. B. Foley	
Rky. Mt.-Denver	Apr. 22	Lakewood Country Club		Ladies Night
St. Louis	Apr. 23	Stratford Hotel, Alton	H. A. Ball	Copper-Base Alloys — Applications and Properties
Saginaw Valley	Apr. 20	Frankenmuth	Jerome Strauss	Hot Extrusion of Steel
Savannah River	Apr. 8	Commercial Hotel		Chapter Charter Night
Springfield	Apr. 19	Greenfield, Mass	Morris Cohen	New Developments in High Speed Steel
Syracuse	Apr. 6	Onondaga Hotel	Frank Foote	Metallurgy and Nuclear Power
Texas	Apr. 6	Ben Milam Hotel	A. J. Langhammer	Powder Metallurgy
Tri-City	Apr. 6	Rock Island Arsenal	C. E. Jackson	Metallurgy of Welding
Tulsa	Apr. 6	Michaelis Cafeteria	Reidel	Tool Failures
Utah	Apr. 22	Salt Lake City	A. R. Lytle	Research in Action
Warren	Apr. 8	El Rio Restaurant		Plant Visit
Washington	Apr. 12	Naylors Restaurant	T. L. Fritzlen	Developments in Aluminum
Wichita	Apr. 20	K. of C. Hall	K. Rose	Crystal Formation
Worcester	Apr. 14	Wachusett Country Club	W. B. Reed	Ladies Night
York	Apr. 14	York	J. B. Austin	Magnification in Time

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Fred Body, Ardeth Holmes, Mildred Landon and Members of the Translation Group

A General Metallurgical

44-A. Coming Changes in Iron and Steel. Clarence E. Sims. *Battelle Technical Review,* v. 3, Jan. 1954, p. 7-8.

Iron and steel industry will lean heavily on technology to insure receipt by the nation of greater quantities of iron and steel at low cost. (A4, CI, ST)

45-A. Metallurgy. H. A. Holden. *Chemical & Process Engineering,* v. 34, Dec. 1953, p. 384-387.

Rare earth and boron alloy steels and methods of their corrosion protection and cold working. Magnesium, titanium, zirconium, molybdenum, vanadium and other rare metals. Photographs, table. 105 ref. (A general)

46-A. Space Control in a Modern Factory. *Engineers' Digest,* v. 14, Dec. 1953, p. 454-456.

Consideration of rate of production, production potential and type of product as basis for space control. Photographs. (A5)

47-A. Business Roundup. *Iron Age,* v. 173, Jan. 7, 1954, p. 302-305.

Forecasts business trends for 1954. Diagram, table. (A4, ST, Al, Cu, Ni, Pb, Zn)

48-A. Metals & Materials. *Iron Age,* v. 173, Jan. 7, 1954, p. 306-313.

Reviews 1953 and forecasts 1954 markets. Graphs, diagram, photographs, tables. 6 ref. (A4)

49-A. Production Processes. *Iron Age,* v. 173, Jan. 7, 1954, p. 314-342.

Outstanding developments in metalworking processes during 1953 and significant production trends for 1954. Photographs, graphs, diagram. 55 ref. (A5, A4)

50-A. Handbook of Terms Commonly Used in the Nonferrous Industries. *Iron Age,* v. 173, Jan. 7, 1954, p. 343-344, 348, 351-354, 356-364, 366, 369-382.

Aluminum, copper and brass and magnesium fields. (A10, Al, Cu, Mg)

51-A. Price and Production Data. *Iron Age,* v. 173, Jan. 7, 1954, p. 405-420.

Steel industry, nonferrous, pig iron, ore, ferro-alloys and iron and steel scrap. Tables. (A4)

52-A. Application of Research to an Industry Composed of Small Firms. C. N. Kington. *Metal Treatment and Drop Forging,* v 20, Dec. 1953, p. 597-603.

Means to overcome financial, technical and human problems in small firm research. (A9)

53-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 20, Dec. 1953, p. 604-610.

From "jolly" to "kink". Drawings, tables, graphs, photograph. (A10)

54-A. Toxicity of Beryllium. Carl S. Pomelee. *Sewage and Industrial Wastes,* v. 25, Dec. 1953, p. 1424-1428.

Problems in handling of waste materials and their disposal. (A8, A7, Be)

55-A. Stop Oxyacetylene Fires. Carl Saacke and R. L. Deily. *Welding Engineer,* v. 39, Jan. 1954, p. 22-25.

Condensation of paper at 41st National Safety Congress, Chicago, Oct. 1953. Safety rules and their importance. Graph, diagrams, photograph. (A7, K2)

56-A. New B.I.S.R.A. Laboratories Opened in Sheffield. *Wire Industry,* v. 20, Dec. 1953, p. 1185-1186.

Facilities, including metalworking shop, wire drawing machine, rolling mill and fatigue testing machines. Photographs. (A9, F general, ST)

57-A. (English.) **Modern Conception of Ware House of Special Steels.** *Aciers Fins & Spéciaux Francais,* 1953, no. 13, Mar., p. 45-50.

Organization of depots for sale of special steels in Paris. Photographs. (A5, ST)

58-A. (Hungarian.) **Safety Measures During Magnesium Processing.** Gyula Emod. *Aluminium (Budapest),* v. 5, no. 13, Mar., p. 45-50.

Safety measures necessary in the storage room. Extinguishing of fires and safety measures during cutting, machining and casting. 7 ref. (A7, E general, G17, Mg)

59-A. (Hungarian.) **Utilization of Salt Residues and Scrapings Arising During the Processing of Light Metals and Light Metal Scrap.** Andras Domony. *Aluminium (Budapest),* v. 5, no. 12, Dec. 1953, p. 245-247.

Investigations to determine quantity of valuable materials lost in salt residues and scrapings. Proposes method for recovery. Composition of waste material. Tables. (A8, Al)

60-A. (Hungarian.) **Management of Electric Power in Metallurgy.** Béla Havas. *Kohaszati Lapok,* v. 8, no. 12, Dec. 1953, p. 260-263.

Formulates and discusses basic principles for an economical management of electric power. Optimum exploitation of power plants, proper application of power and continuous production. Tables. (A5)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

61-A. Recovery of Manganese in Steel Mill Operations. E. C. Wright. *American Iron and Steel Institute, Preprint,* Oct. 21, 1953, 23 p.

Paper presented at Birmingham Regional Technical Meeting of AISI, Oct. 21, 1953. Diagrams, tables. (A8, Mn, ST)

62-A. The Use of Steel Plant Byproducts. E. H. Rose and J. Forrest Kimball. *American Iron and Steel Institute, Preprint,* Oct. 21, 1953, 14 p.

Paper presented at the Birmingham Regional Technical Meeting of AISI, Oct. 21, 1953. (A8)

63-A. Iron, Steel and American History. E. N. Hartley. *American Iron and Steel Institute, Preprint,* 1953, 17 p.

Paper presented at 1953 Regional Technical Meeting of AISI, Youngstown, Chicago, Birmingham, San Francisco and Philadelphia. Sections on rise and fall of ironworks; restoration begins; hammersmith was prototype; similarity to modern enterprise; ironworks affected society; industry was a catalyst; economic facts of life; push toward innovation; industry as a frontier; working for the good of all; standard of living improved; industrial history skimped; opportunity at hand; and industry is basic. (A2)

64-A. The Two-Stage Process for the Recovery of Manganese From Open Hearth Slag. A Full Scale Production Trial. H. W. Hosking and J. A. Gregory. *Australasian Engineer,* 1953, Dec., p. 48-57.

Data were acquired and more satisfactory application foreshadowed. Photographs, tables. 3 ref. (A8, B21, Mn)

65-A. Over Thirty-Two Million Tons of Purchased Scrap Consumed in 1953. Edwin C. Barringer. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 43-44.

Supply and demand discussed. Photograph. (A8, A4)

66-A. British Iron and Steel Industry. II. *Engineer,* v. 197, Jan. 8, 1954, p. 66-68.

Includes photographs. (A4, Fe, ST)

67-A. Retrospect and Prospect. II. Raw Materials. *Engineering,* v. 177, Jan. 8, 1954, p. 42-44.

Trends in nonferrous metals; new applications of aluminum; price of iron and steel in Britain; future demand for steel; and steel abroad. Graphs. (To be continued.) (A4, Al, Fe, ST)

68-A. From Raw Material to Finished Product. I. James M. Leake. *Finish,* v. 11, Jan. 1954, p. 25-27.

Early iron smelting practices, use of precious metals and bronze in Biblical times, later developments through Middle Ages and the Renaissance and effects of industrial revolution. Photographs. (A2)

69-A. Business Roundup. *Fortune,* v. 49, Feb. 1954, p. 25-26, 28, 30, 32.

Report on the economic outlook. Graphs. (A4)

70-A. Modern Scrap Yard Keeps Pace With Market. J. B. Schlossberg. *Iron Age,* v. 173, Jan. 14, 1954, p. 118-121.

Use of automatic controls on machinery, safety measures and public address system for efficiency. Photographs, diagram. (A8, A5)

71-A. Annual Materials Engineering Review and Forecast. T. C. DuMond. *Materials & Methods* v. 39, Jan. 1954, p. 111-126.

Appraisal of the past year's developments in engineering materials reveals some changes in use of materials that probably will be forthcoming in 1954. Photographs. (A4)

72-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 21, Jan. 1954, p. 29-34.

From "kindling temperature" to "laterite." (To be continued.) (A10)

73-A. The New Radiometallurgy Laboratory at Hanford. *Nucleonics,* v. 12, Jan. 1954, p. 26-27.

Structure which provides complete facilities for metallurgical studies of irradiated metals. Photographs, diagrams. (A9, S19)

74-A. Fly Ash From Power Plants May Yield Commercial Germanium. *Power Engineering,* v. 58, Jan. 1954, p. 65.

Results of studies of 13 boiler installations in six power plants may indicate large scale source of element. (A8, Ge)

75-A. Imperfections in Matter. G. W. Rathenau. *Philips Technical Review,* v. 15, Oct. 1953, p. 105-113.

Phenomena inherent in idealized solids and others which are due to disturbances or imperfections in the system. Micrographs, graphs. 27 ref. (M27)

76-A. Materials Handling in the Warehouse. *Screw Machine Engineering,* v. 15, Jan. 1954, p. 43-45.

Equipment and handling processes. Photographs. (A5)

77-A. Review of Literature on Health Hazards of Metals. I. Copper. Sara J. Davenport. *U. S. Bureau of Mines, Information Circular* 7666, Nov. 1953, 114 p.

Voluminous data available for publication by Bureau of Mines revised and brought up to date. 230 ref. (A7, Cu)

78-A. New Methods of Illumination in the Wire Industry. Friedrich Baierl. *Draht (English Ed.),* 1953, no. 17, Dec., p. 39-40.

Basic requirements for good illumination and suggestions for arrangement of suitable lighting installations in work rooms. Tables. (A5, F28)

79-A. Work Simplification Saves $300,000 in Six Years. W. S. Williams. *American Foundryman,* v. 25, Feb. 1954, p. 54-57.

Work simplification and training of employees to develop methods of doing work in the most simple way have saved Lynchburg Foundry Co. $300,000 in six years. Photographs. (A5)

80-A. Developments in the Iron and Steel Industry During 1953. I. E. Madsen. *Iron and Steel Engineer,* v. 31, Jan. 1954, p. 120-158.

Production, expansion, foreign plants, raw material supplies, improvements in melting and rolling, controls, materials handling and mechanical and electrical equipment. Photographs, diagrams, graph, table. (A general, D general, F general, ST, CI)

81-A. The Industry in the World Today. *Light Metals,* v. 17, Jan. 1954, p. 25-26.

Special problems which the Italian light-metals industry is encountering. Production and application. Tables. (To be concluded.) (A general, T general, Al)

82-A. Metals, Minerals and Alloys. *Mining Journal,* v. 242, Jan. 15, 1954, p. 76-77.

Market conditions for copper, lead, tin, zinc, nickel and manganese. (A4, Cu, Pb, Sn, Zn, Ni, Mn)

83-A. Birth of an Industry. Arthur C. Bining. *Steelways,* v. 10, Feb. 1954, p. 12-15.

Development of steelmaking from primitive times to the seventeenth century. Diagrams. (A2, ST)

84-A. (French.) **What Will Be Happening in 1962?** G. A. Baudart. *Revue de l'Aluminium,* v. 30, no. 205, Dec. 1953, p. 427-429.

Shows that consumption of aluminum has doubled every ten years. Possibilities of achieving balance between European and African resources and demand. (A4, B10, Al)

85-A. (Book) **Engineering Alloys. Names, Properties, Uses. 3rd Ed.** Norman E. Woldman. 1034 p. 1954. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio. $15.00.

Practical and technical reference book on engineering alloys. Sections include alloy index and data; directory of manufacturers and their alloys; key index to manufacturers; and a useful data appendix. (A10)

86-A. (Book.) **The First Iron Works Restoration.** 30 p. 1953. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y. $0.25.

Work leading to the faithful and authentic reproduction of one of America's earliest industrial landmarks, the first iron works at Saugus, Mass. (A2, Fe)

87-A. (Book.) **The Growth of the Major Steel Companies, 1900-1950.** Gertrude G. Schroeder. 244 p. 1953. Johns Hopkins Press, Baltimore.

A statistical picture of the absolute and relative growth of the various companies. (A4, ST)

88-A. (Book.) **An Outline of the Development of the George Fischer Works.** 23 p. 1950. George Fischer, Ltd., Schaffhausen, Switzerland.

History of the George Fischer Iron and Steel Works, from its founding in 1802 to the present time. (A5, D general, ST)

B

Raw Materials and Ore Preparation

41-B. Flotation. Robert B. Booth. *Industrial and Engineering Chemistry,* v. 46, Jan. 1954, p. 105-111.

Developments in sulfide and oxide metallic ores and nonmetallics including coal. 81 ref. (B14)

42-B. Leaching. Robert A. Ebel. *Industrial and Engineering Chemistry,* v. 46, Jan. 1954, p. 126-129.

Pilot plant developments of both new processes and new equipment. Work has been done predominantly in sugar, metallurgical and oilseed industries. 88 ref. (B14)

43-B. Iron Ores. A. Grieve. *Iron & Steel,* v. 26, Dec. 11, 1953, p. 617-620; disc., p. 663-666.

Paper from the Symposium on Sintering, following the Iron and Steel Institute, Autumn General Meeting, 1953. Results of experimental studies of softening at high temperatures. Tables, graphs. (B16, Fe)

44-B. Blast-Furnace Raw Materials. E. W. Nixon and F. R. Maw. *Iron & Steel,* v. 26, Dec. 11, 1953, p. 643-645; disc., p. 666-671.

Paper from the Symposium on Sintering, following the Iron and Steel Institute, Autumn General Meeting, 1953. Materials, apparatus and techniques for permeability tests. Graphs. (B16, B22, Fe)

45-B. Sintering Practice at Domnarfvet. Christer Danielsson. *Iron & Steel,* v. 26, Dec. 11, 1953, p. 654-655; disc. p. 672-674.

Paper from the Symposium on Sintering following the Iron and Steel Institute, Autumn General Meeting, 1953. Raw materials, equipment, practices and production. Table, graph. (B16, Fe)

46-B. Activities of Constituents of Iron and Steelmaking Slags. II. Manganous Oxide. III. Posphorus Pentoxide. E. T. Turkdogan and J. Pearson. *Iron and Steel Institute, Journal,* v. 175, Dec. 1953, p. 393-398.

Equilibrium constant of manganese reaction has been calculated and used, in conjunction with ferrous oxide activity diagram from part I, to evaluate activity of manganous oxide in MnO-FeO-SiO_2 and some basic steelmaking slags. Graphs, diagrams. 12 ref. (B21, D general, P12, Fe)

47-B. Effect of Gangue Size on Flotation. George W. Mao. *Mines Magazine,* v. 43, Dec. 1953, p. 23-26, 28, 42.

Effects of particle size on flotation and hypotheses of slime-coating mechanism. Tables, graphs. 11 ref. (B14)

48-B. Study of Slags With High Titanium Content. W. Freundlich. Henry Brutcher, Altadena, Cal., Translation no. 3005, 27 p. + 3 plates. (From *Bulletin de la société chimique de France,* 1952, May-June, p. 655-663.)

Previously abstracted from original. See item 320-B, 1952. (B21, Ti)

49-B. Viscosity Measurements of Synthetic Slags in FeO-SiO_2-TiO_2 System. G. Urbain. Henry Brutcher, Altadena, Cal., Translation no. 3068, 4 p. + 1 plate. (From *Comptes rendus,* v. 232, p. 330-332.)

Viscosity determinations in Armco-iron crucible by principle of damped oscillations. Diagram, graphs. 4 ref. (B21)

50-B. (German.) **The Production of Lead From Ores, Residues and Scrap.** P. O. Poettken. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 886-892.

Beneficiation, roasting and smelting of ores, refining crude metal, and old and new methods of extracting silver. Diagrams, photographs. 5 ref. (B14, B15, C21, A8, Pb, Ag)

51-B. (Hungarian.) **Opening Speech of Undersecretary Bese Vilmos, at the Bauxite-Alumina Meeting at Ajka, on June 20-21, 1953.** *Aluminium (Budapest),* v. 5, no. 10, Oct. 1953, p. 205-207.

Future tasks of bauxite and alumina industry in Hungary. Maintaining quality of bauxite, discovering new high-quality bauxite deposits, developing technology of existing plants, effecting savings in electrical power consumption, training the labor force and improving quality of aluminum produced. (B10, B14, Al)

52-B. (Hungarian.) **Problems of Quality in Bauxite Production.** Endre Alliquander. *Aluminium (Budapest),* v. 5, no. 10, Oct. 1953, p. 208-213.

Methods by which quality of bauxite can be established. Measures necessary for evaluating Hungarian bauxite deposits including revision of modulus system introduced from Russia. Future possibilities and difficulties in bauxite production and processing. (B10, B14, Al)

53-B. Recovery of Manganese From Low-Grade Ores. Louis N. Allen, Jr. *Chemical Engineering Progress,* v. 50, Jan. 1954, p. 9-13.

Process in which low-grade manganese concentrates are chemically treated to make high-grade manganese oxide product. Diagram, photographs, tables. 1 ref. (B14, Mn)

54-B. Erie Ready to Start Work on Big Taconite Project. Elton Hoyt. *Engineering and Mining Journal,* v. 155, Jan. 1954, p. 78-79.

New plant will concentrate and pelletize Mesabi taconite. Photograph. (B14, B16)

55-B. Differential Grinding in Cyclone Shown by Screen Tests. Stephen E. Erickson. *Engineering and Mining Journal,* v. 155, Jan. 1954, p. 95, 168.

Results with Mesabi intermediate ore before and after passing through 6-in. unit show definite effects. Tables, diagram. (B13, Fe)

56-B. Ferrocoke. A. R. Myhill. *Mechanical World and Engineering Record,* v. 134, Jan. 1954, p. 36-37.

A new development which produces a coke-iron combination ready for charging into the furnace. (B22)

57-B. The Influence of Frothers Upon the Grade of Flotation Concentrates. S. A. Wrobel. *Mine & Quarry Engineering,* v. 20, Jan. 1954, p. 32-38.

Laboratory results showing both recovery and purity of flotation concentrates are influenced by frother used. Tables, graphs. (B14)

58-B. Developments for Increased Production at Climax. John M. Petty. *Mining Congress Journal,* v. 40, Jan. 1954, p. 24-29.

From Climax, near Fremont Pass, Colo., comes a major portion of the world's molybdenum. Improved equipment, methods and controls helped achieve and maintain daily production of 10,000 to 12,000 tons. Photographs, diagrams. (B general, Mo)

59-B. Methods of Processing Uranium Ores. S. J. Swainson. *Mining Congress Journal,* v. 40, Jan. 1954, p. 48-50.

Plant design depends on ore to be treated but basic steps are similar. Photographs. (B general, U)

60-B. How Getchell Gold Mill Recovers Tungsten. *Mining World,* v. 16, Jan. 1954, p. 38-42.

The Getchell mill, formerly a gold producer, is an excellent example of conversion of existing mills to tungsten concentration. Table, flowsheets, photographs. (B13, B14, W, Au)

61-B. The Third Sir Julius Wernher Memorial Lecture: Radioactivity in Mineral Dressing. A. M. Gaudin. Paper from "Recent Developments in Mineral Dressing, Symposium," p. xv-xxvii, Sept. 1952. Institute of Mining and Metallurgy, London, England.

Ways in which radioactivity can be made to serve the purposes of the mineral engineer, in research in operative control and in the development of new mineral separating processes. (B14)

62-B. Purpose in Fine Sizing and Comparison of Methods. E. J. Pryor, H. N. Blyth and A. Eldridge. Paper from "Recent Developments in Mineral Dressing, Symposium," p. 11-30; disc., p. 85-97 + 3 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Each method gave results well within the limits of experimental error of normal head-sampling and of cutting test samples of ores used. Sedimentation method (breaker decantation) gave best results on material used in tests described. Graphs, tables, diagram. (B13)

63-B. Fundamental Principles of Sub-Sieve Particle Size Measurement. H. Heywood. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 31-58; disc., p. 85-97 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Fundamental principles underlying sedimentation processes in form suitable for a critical analysis of the manifold applications of particle motion in fluids to industrial problems. Diagrams, tables, graphs. 11 ref. (B13)

64-B. The Technique of Particle Size Analysis in the Sub-Sieve Range. G. Lowrie Fairs. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 59-74; disc., p. 85-97 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Four selected methods of size analysis. Tables, diagrams. 8 ref. (B11)

65-B. Release Analysis, A New Tool for Ore Dressing Research. C. C. Dell. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 75-84; disc., p. 85-97. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Technique of 'release analysis' has so far been carried out only with Mufulira copper ore, but it is believed that it will find general application elsewhere to the problem of dealing with middlings and possibly even to separation methods other than flotation. Graphs, tables, diagram. (B14, Cu)

66-B. Mathematics of Crushing and Grinding. Fred C. Bond. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 101-115; disc., p. 163-180. Sept. 1952. Institute of Mining and Metallurgy, London, England.

New theory of comminution which states that the total work input represented by a given weight of a crushed or ground product is inversely proportional to the square root of the diameter of the product particles. 8 ref. (B13)

67-B. A Method of Assessing the Grinding Efficiency of Industrial Equipment. W. F. Carey and C. J. Stairmand. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 117-136; disc., p. 163-180 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

The associated energy concept provides a yardstick by means of which a practical value may be obtained for the grinding efficiency of industrial mills. Tests have been carried out on a number of installed mills and net grinding efficiencies ranging from 6 to 36% have been observed. Graphs, tables. 6 ref. (B13)

68-B. Defining the Scope of the Open Circuit Rod-Mill in Comminution. J. F. Myers. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 137-150; disc., p. 163-180 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Includes diagrams, tables. (B13)

69-B. Crushing and Screening in Mineral Dressing Plants. G. J. Brown. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 151-162; disc., p. 163-180 + 3 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Developments in crushers and screens, selection of crusher to suit the ore and importance of screen analysis. Diagrams. (B13)

70-B. Recent Developments in Classification and Fluidization as Applications of the Principles of Particle Dynamics. J. V. N. Dorr and F. L. Bosqui. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 185-204; disc., p. 205-207 + 2 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Latest developments in classification and 'FluoSolids' technique. Attempts to illustrate two unit processes, diverse as regards objective, but basically related as applications of the principles underlying particle dynamics. Tables, diagram. 24 ref. (B14)

71-B. A Study of the Motion of Solid Particles in a Hydraulic Cyclone. D. F. Kelsall. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 209-227; disc., p. 247-256 + 4 plates. Institute of Mining and Metallurgy, London, England.

Optical method of solid particles within an operating cyclone has thrown new light on mechanism of particle separation and revealed undesirable flows which reduce efficiency. Graphs, table, diagram. 14 ref. (B14)

72-B. The Hydrocyclone, Its Application and Its Explanation. F. J. Fontein and I. C. Dijksman. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 229-246; disc., p. 247-256. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Survey of the most essential fields of application known at present time. A general insight into the operation of the cyclone is provided. Diagrams, graphs, tables. 8 ref. (B14)

73-B. Major Alterations in Heavy Media Separation Practice During Recent Years. K. A. Fern. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 271-278; disc., p. 288-295. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Originally developed in treatment of lead-zinc ores and of iron ores, the heavy media separation process is now being used to treat a wide range of metallic and nonmetallic minerals, from diamonds at one end of the scale to gravel at the other. Tables. (B14)

74-B. Recent Developments in Plant Design for Dense Medium Processes. F. J. Trotter. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 279-287; disc., p. 288-295. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Continuous progress has been made during the past two decades in developing dense medium separation into a firmly established method of ore concentration. In its infancy the process was at best looked upon as an effective substitute for jigging, but its considerably wider scope has now been fully recognized and has led to a large number of applications where jigging could not be applied at all. (B14)

75-B. Recent Developments in Gravity Concentration. F. B. Michell. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 261-269; disc., p. 288-295 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

It now appears that flotation may be losing some of its pre-eminence as a dressing method and leaching is being examined more closely than heretofore. As a result, there may be a revival of gravity methods for a rough concentration of some ores and as a preliminary to the adoption of leaching techniques. Diagrams. 6 ref. (B14)

76-B. Concentrating Ores by Pneumatic Tables. E. A. Knapp. Paper

from "Recent Developments in Mineral Dressing, Symposium." p. 299-311; disc., p. 321-323 + 2 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Results in tabular form on samples of various ores. In practice cleaner concentrate could be produced as the line of concentrate would be larger. Tables, flowsheets. 10 ref. (B14)

77-B. Concentration of Eluvial or Co-Eluvial Deposits in Arid Areas. E. A. Knapp and C. T. Sweet. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 313-320; disc., p. 321-323 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Progress in further development of machine for concentration of minerals by dry methods. Tables, diagrams. (B14)

78-B. Magnetic Separation Applied to Mineral Dressing. T. G. Hawker. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 325-334; disc., p. 349-357 + 4 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Modern types of magnetic separators. Future trends. Graph, tables, diagram. (B14)

79-B. Electrostatic Separation. S. B. Hudson. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 335-348; disc., p. 349-357. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Principles and properties of the plate-type separator. Tests on the separation of zircon and rutile. Tables, graphs. 7 ref. (B14, Zr, Ru)

80-B. Photometric Separation of Ores in Lump Form. P. C. Newman and P. F. Whelan. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 359-381; disc., p. 382-383 + 1 plate. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Barytes, bauxite, blue marl, calcite, chromite, fluorspar, gypsum, limestone, magnesite, pyrite, witherite and witherite gangue were tested. Diagrams, tables, graphs. (B14)

81-B. The Relation of Crystal Lattice Discontinuities to Mineral Dressing. A. J. E. Welch. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 387-392; disc., p. 423-430. Sept. 1952. Institute of Mining and Metallurgy, London, England.

How fundamental processes of mineral dressing may be influenced by characteristic properties of crystal lattices. (B13, M26)

82-B. Selective Flotation of Metals and Minerals. J. H. Schulman. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 393-413; disc., p. 423-430. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Adsorption of agents used in monolayer experiments, onto metal and mineral powders, has been investigated quantitatively. This necessitated area determinations of the powder and measurement of small changes in concentration of solutions of the agent. Graphs, diagrams, tables. 17 ref. (B14)

83-B. The Surface Chemistry of Flotation. Nathaniel Arbiter. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 415-422; disc., p. 423-430. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Structure of the interface, thermodynamics of surface reactions and wetting effects. 27 ref. (B14, P10)

84-B. Flotation Frothers, Their Action, Composition, Properties and Structure. S. A. Wrobel. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 431-450; disc., p. 451-454. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Several of the more important specific characteristics of flotation frothers and their dependance upon molecular structure and constitution correlated and discussed. Diagrams, tables. 33 ref. (B14)

85-B. The Process of Bubble-Mineral Attachment. L. F. Evans and W. E. Ewers. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 457-463; disc., p. 464. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Theory at the collision process, experimental measurements on flotation and allied systems and experimental studies on thinning over hydrophilic and hydrophobic surfaces. Diagrams. 8 ref. (B14)

86-B. Radioactive Isotopes in Mineral Dressing Research, With Particular Reference to Flotation. John S. Carr. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 465-498; disc., p. 499-501. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Radioactivity has been discussed in detail in current literature. Certain aspects presented as an introduction to the discussion of the mineral dressing applications. Tables, diagram. 88 ref. (B14, S19)

87-B. The Application of Electrochemical Methods to Flotation Research. S. G. Salamy and J. C. Nixon. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 503-516; disc., p. 517-518. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Results show that the reactions at a mercury surface in the presence of xanthates are governed by dissociation constants of complex ions and by solubility products of collector-metal compounds at the surface. Graphs. 15 ref. (B14)

88-B. Effects of Soluble Sulphide in the Flotation of Secondary Lead Minerals. M. G. Fleming. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 521-548; disc., p. 549-554. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Technical investigation of ore from the Abenab West mine of the South West Africa Co., Ltd. Graphs, tables, diagram. 37 ref. (B14, Pb)

89-B. Some Aspects of the Flotation of Oxidized Minerals. E. J. Pryor. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 555-566; disc., p. 567-570. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Importance of dissolved salts in the mill pulp, fatty acids and frothing and froth texture. Table, diagram. (B14)

90-B. The Flotation of Oxidized Zinc Ores. Maurice Rey and Paul Raffinot. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 571-576; disc. p. 577-579. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Mineralogy of and collecting reagents for oxidized zinc materials, milling plants and results of tests. 9 ref. (B14, Zn)

91-B. Arsenic and Antimony Sulphide Minerals in Cyanidation. N. Hedley and H. Tabachnick. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 583-602; disc. p. 603-607. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Present work determines relative rates of decomposition of arsenopyrite, orpiment, realgar and stibnite in cyanide solutions of various alkalinities; nature of decomposition products; effects of these minerals on rate of gold dissolution; and investigates means for correcting deleterious effects of minerals in cyanidation. Graphs, tables. 4 ref. (B14, C24, As, Sb)

92-B. The Treatment of Ore From the Gold Mines of Union Corporation, Ltd.; A Summary of Metallurgical Practice. O. A. E. Jackson. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 609-619; disc., p. 620-624. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Important functions of crushing, milling and cyanide sections of five mines in South Africa. Flowsheet, table. (B13, C24, Au)

93-B. The Heavy-Media Plant at Stripa Mine, Sweden. S. Dalhammar and P. H. Fahlström. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 627-630; disc., p. 631-632. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Includes diagram, table. (B14)

94-B. Recent Developments in Practice at the Sullivan Concentrator. H. R. Banks. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 633-640; disc., p. 641-646 + 2 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Number of important changes in crushing, transportation and concentration of the ore extracted from the Sullivan mine of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Kimberley, B. C., were introduced in 1949. Observations regarding effectiveness after some two years of operation. 4 ref. (B13, B14)

95-B. The Development of Milling Technique at the Boliden Mining Company. P. G. Kihlstedt. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 659-666; disc., p. 667-669. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Milling program, controlized research and a review of work accomplished. Table, diagram. (B13)

96-B. The Quemont Milling Operation. C. G. McLachlan, M. J. S. Bennett and R. L. Coleman. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 671-697; disc., p. 698-699 + 3 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Milling operation of the Quemont Mining Corp., Ltd. Mineralogical association and analysis, preparation for production, crushing, conveying and grinding, copper flotation, primary zinc, pyrite and scavenging flotation circuits, copper cleaning circuit and copper concentrate handling, secondary zinc cleaning circuit and zinc concentrate handling, pyrite pretreatment circuit and cyanide and pyrite drying plants. Diagrams, tables. 6 ref. (B13, Cu, Zn)

97-B. Design and Construction of Small Concentrators in British Columbia. H. M. Wright. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 719-750; disc., p. 751-753 + 6 plates. Sept. 1952. Institute of Mining and Metallurgy, London, England.

Requirements for mill design. Design and construction of six small plants in British Columbia. Tables, flowsheets. (B14)

98-B. Significance of Mechanism and Rate of Collecting for Intensification of the Flotation Process. V. A. Glembotskii. Henry Brutcher, Altadena, Cal., Translation no. 2542, 11 p. (From *Izvestiya Akademii Nauk SSSR, Otd. Tekh. Nauk,* 1950, no. 2, p. 253-258.)

Previously abstracted from original. See item 189-B, 1950. (B14)

99-B. (German.) **The Effect of Granulation on the Properties of Slag Sands.** Walter Kramer. *Stahl und Eisen,* v. 73, no. 24, Nov. 19, 1953, p. 1596-1600.

Experimental production of granular and spongy blast-furnace slag sands. Composition and effect of granulation on properties of brick and cement made from these slags. Diagrams, photographs, tables, graphs. (B19)

100-B. (German.) **Problems of Ore Beneficiation in Yugoslavia. III.** Werner Gründer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 6, no. 12, Dec. 1953, p. 477-484.

Laboratory and large-scale experiments have solved important problems in beneficiation of chromium, mercury, tungsten and manganese ores. Equipment and ore-dressing methods. Tables, diagrams, graphs, micrographs. (B14, Cr, Hg, W, Mn)

101-B. (Portuguese.) **Metal Mining in Sweden and Its Geological Panorama.** Olof H. Odman. *Engenharia, mineracao e metalurgia,* v. 18, no. 107, July-Aug. 1953, p. 221-226.

Development of mining industry as a factor in Sweden's economic situation. Geological deposits. Maps, tables. (B10, B12)

102-B. (Portuguese.) **Suggestions for the Development of Mineral Production in the Northeast.** Alberto Ildefonso Erichsen. *Engenharia, mineracao e metalurgia,* v. 18, no. 107, July-Aug. 1953, p. 247-248.

Territories in Brazil which are most promising. Advocates creation of a large regional organization to carry out necessary scientific and technical studies. Photographs. (B10)

103-B. Studies on Contact Angle Measurements & Their Application to the Concentration of Manganese Ores by Froth Flotation. I. Contact Angle Studies at the Pyrolusite Surface. II. Beneficiation of Low Grade Manganese Ores by Froth Flotation. U. N. Bhrany and M. R. A. Rao. *Journal of Scientific & Industrial Research,* v. 12, sec. B, Dec. 1953, p. 590-604.

Experimental results. Tables, graphs. 39 ref. (B14, Mn)

104-B. Nodulizing Iron Ores and Concentrates at Extaca. R. L. Bennett, R. E. Hagen and M. V. Mielke. *Mining Engineering,* v. 6, Jan. 1954, p. 32-38.

Experimental kiln provides data on agglomeration of high-grade ore fines and taconite concentrates. Photographs, diagram. Graph, tables. (B16, Fe)

105-B. Lead-Zinc Deposits of the Dunkleberg District, Granite County, Mont. C. C. Popoff. *U. S. Bureau of Mines, Report of Investigations* 5014, Dec. 1953, 41 p. + 14 plates.

Various ore deposits in the area and conditions relative to mining of the ore. Tables, maps, diagrams. (B10, B12, Pb, Zn, Ag)

106-B. (French.) **The Place of Electrometallurgy in the Industrialization Plans of the French Territories in Africa.** *Journal du Four Electrique,* v. 62, no. 6, Nov.-Dec. 1953, p. 157-160.

Resources of bauxite, manganese, lead and zinc. Maps. (B10, C23, Al, Mn, Pb, Zn)

107-B. (French.) **Iron and Copper Deposits of Mauritania.** Raymond Furon. *Revue générale des sciences pures et appliquées,* v. 60, nos. 9-10, 1953, p. 262-264.

Location of Cu mine discovered in 1945. Ore contained 3% metallic copper with a known reserve of about 200,000 tons. Map. (B10, Cu, Fe)

108-B. (Book.) **Ore Dressing Methods in Australia and Adjacent Territories. v. III.** H. H. Dunkin, editor. 317 p. Australasian Institute of Mining and Metallurgy, 399 Little Collins Street, Melbourne, Australia. £A1 7s, unbound; £A1 17s. 6d. bound

Emphasis on gold, lead, zinc, copper, tin, and tungsten ores. Some nonmetallic industrial minerals are included. (B14, Au, Pb, Zn, Cu, Sn, W)

109-B. (Book.) **Recent Developments in Mineral Dressing, Symposium.** 766 p. Sept. 1952. Institution of Mining and Metallurgy, London, England. $8.50.

A symposium arranged by the Institution of Mining and Metallurgy, held Sept. 23-25, 1952. Papers are separately abstracted. (B13, B14)

C
Nonferrous Extraction and Refining

26-C. The Electrolytic Preparation of Molybdenum From Fused Salts. I. Electrolytic Studies. II. The Preparation of Reduced Molybdenum Halides. III. Studies of Electrode Potentials. Seymour Senderoff and Abner Brenner. *Electrochemical Society, Journal,* v. 101, Jan. 1954, p.16-38.

Photograph, diagrams, tables, micrographs, graphs. 48 ref. (C23)

27-C. Continuous Casting Machine for Copper Ingots. *Engineering,* v. 176, Dec. 25, 1953, p. 809-810.

Construction and operation of a unit capable of delivering ingots at 15 tons per hr. Photographs. (C5, Cu)

28-C. Making the Best of Metals. *Institute of Metals, Journal,* v. 82, 1953; *Institute of Metals, Bulletin,* v. 2, Dec. 1953, p. 28-53; disc., p. 53-55.

Symposium of Birmingham Local Section of Institute of Metals on Feb. 27, 1953. Includes "Non-Ferrous Metal Resources", R. Lewis Stubbs; "Some Elementary Thermodynamics of Refining", V. Kondic; "The Preparation of Refined Copper and Copper-Base Alloys From Metal Scrap", H. J. Miller; "Remelting and Refining of Aluminium Alloys", E. Scheuer; "The Aluminothermic Process and Its Variants", T. Burchell; "The Recovery of Copper and Zinc From Liquid and Gaseous Effluents", S. Hands; and "The Economical Use of Metals", W. L. Hall and E. C. Mantle. 41 ref. (C general, A8, EG-a)

29-C. Shapes of Floating Liquid Zones Between Solid Rods. P. H. Keck, M. Green and M. L. Polk. *Journal of Applied Physics,* v. 24, Dec. 1953, p. 1479-1481.

Theoretical and experimental determinations for stable zones between germanium and silicon rods during purification. Table, graph, diagrams. 5 ref. (C28, Si, Ge)

30-C. Production of Pure Zirconium. *Metal Industry,* v. 83, Dec. 25, 1953, p. 522-523.

Equipment and techniques employed. Photographs. (C general, Zr)

31-C. Copper-Base Continuous Castings. *Precision Metal Molding,* v. 12, Jan. 1954, p. 44-45, 48.

New method of casting with advantages and uses of its products. Photographs, table. (C5, Cu)

32-C. Quantitative Study of Extraction of Titanium Dioxide From Ilmenite by Smelting. I. W. Freundlich. Henry Brutcher, Altadena, Cal., Translation no. 3119, 25 p. + 1 plate. (From *Bulletin de la société chimique de France,* v. 19, no. 5, 1952, p. 490-496.)

Previously abstracted from original. See item 135-C, 1952. (C4, Ti)

33-C. (German.) **Observations on the Continuous Casting of Light Metal Billets.** K. E. Mann. *Aluminium,* v. 29, no. 12, Dec. 1953, p. 497-508.

Faults occurring during continuous casting of aluminum and magnesium alloys. Mechanical properties of alloys prepared by continuous casting. Micrographs, photographs, tables. (C5, Q general, Al, Mg)

34-C. (German.) **Purifying Industrial Zinc Sulfate Solutions by Cementation.** H. Enzfelder. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 98, no. 11, Nov. 1953, p. 227-234.

Electrolytic methods were used to extract zinc from the ore. Procedure for precipitating disturbing elements from zinc sulfate solutions. Tables, graphs. 35 ref. (C27, B14, Zn)

35-C. (German.) **Processing Zinc Dust and Dross in the Directly Heated Revolving-Drum Furnace.** G. Lorber. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 861.

Efficient method of extracting zinc. Photographs, table. (C21, A8, Zn)

36-C. (German.) **Process of Producing Tin Solder and Antifriction Metals.** H. Kiessler. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 870-872.

Specifications. Tables. 2 ref. (C general, Sn)

37-C. (German.) **The Residual Zinc in the Distillation of Al-Zn Alloys.** H. Schunck. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 875-876.

Factual data on vapor pressures of zinc at different composition and temperatures. Graphs, tables. (C22, Zn, Al)

38-C. (Russian.) **Mechanism of Over-Voltage Formation on the Carbon Anode in Cryolite-Alumina Fusions.** S. I. Rempel and L. P. Khodak. *Zhurnal Prikladnoi Khimii,* v. 26, no. 9, Sept. 1953, p. 931-940.

Origin of high-anode voltage during electrolytic refining of aluminum. Diagram, graphs. 16 ref. (C23, Al)

39-C. How Dowa's Plant Extracts Cu-Zn From a Single Electrolyte. Alpheus W. Jessup. *Engineering and Mining Journal,* v. 155, Jan. 1954, p. 72-74.

Procedure used in this process. Photographs, diagram. (C23, Cu, Zn)

40-C. Australian Metallurgist Reports on African Smelting Progress. L. A. Lyons. *Engineering and Mining Journal,* v. 155, Jan. 1954, p. 96-100.

Types of ores treated, equipment and processes. Tables, photographs. (C21)

41-C. Nickel Production. A. R. Bailey. *Metal Industry,* v. 84, Jan. 8, 1954, p. 23-24.

Ore composition and smelting processes. Table. 16 ref. (C21, Ni)

42-C. Preparation and Casting of Metals and Alloys Under High Vacuum. J. D. Fast, A. I. Luteijn and E. Overbosch. *Philips Technical Review,* v. 15, Oct. 1953, p. 114-121.

Method whereby metals and alloys of extreme purity and precise composition can be produced in a form that lends itself well to further shaping into test specimens or components. Photomicrographs, photographs, diagram, table, graph. 8 ref. (C25, D8)

43-C. Centrifugal Separation of Liquid and Solid Phases From Some Binary Alloys. A. K. Schellinger and M. J. Spendlove. *U. S. Bureau of Mines, Report of Investigations* 5007, Nov. 1953, 19 p. + 21 plates.

Results for experimental tests on use of centrifugal force for separating liquid and solid phases in molten nonferrous alloys. Tables, diagrams, graphs, photographs, micrographs. (C28, Pb, Bi, Sb, Mg, Sn, Fe)

44-C. Electrochemical and Electrometallurgical Industries of Canada. III. Ontario and Manitoba. A. C. Holm. *Electrochemical Society. Journal,* v. 101, Feb. 1954, p. 41C-49C.

Industries and their nation's major power developments. Photographs. (C23, L17)

45-C. Extractive Metallurgy of Zirconium by the Electrolysis of Fused Salts. II. Process Development of the Electrolytic Production of Zirconium From K_2ZrF_6. M. A. Steinberg, M. E. Sibert and E. Wainer. *Electrochemical Society, Journal,* v. 101, Feb. 1954, p. 63-78.

Intensive investigation of optimum conditions. Photomicrographs, tables, diagrams, graphs, photographs. 7 ref. (C23, Zr)

46-C. Casting Titanium. John Ham and Roger Veneklasen. *Foundry,* v. 82, Feb. 1954, p. 94-95.

A vacuum melting and casting system. Photograph, radiograph, diagram. (C25, Ti)

47-C. The Port Pirie Smelters. *Mining Journal,* v. 242, Jan. 8, 1954, p. 43-45.

Production methods and detailed sequence of lead refining operation. Flow sheet, photographs, tables. (C21, Pb)

48-C. Pacific Northwest Aluminum Boom Continues in '54 for All Producers. *Western Metals,* v. 12, Jan. 1954, p. 51.

Continuing expansion program including new equipment and production records. (C23, Al)

49-C. (French.) **Observations on the Preparation of Leaded Bronze.** *Fonderie,* 1953, Nov., no. 94, p. 3693-3696.

Treatment by various slag-forming agents. Tables, graph. (C21, Pb, Cu, Zn, Sn)

50-C. (Book.) **Control of Quality in the Production of Wrought Non-Ferrous Metals and Alloys. I. Control of Quality in Melting and Casting.** Institute of Metals, 4 Grosvenor Gardens, London. 15 s. ($2.50.)

Melting and casting of nonferrous metals and alloys for production of ingots. Includes papers on underlying principles by Singer; brass ingots by Maurice Cook; copper by J. Sykes; zinc by C. W. Roberts and B. Walters; aluminum by R. T. Staples and H. J. Hurst; and magnesium by R. G. Wilkinson and S. B. Hirst. (C21, C5, Cu, Zn, Al, Mg)

51-C. (Book.) **Extractive Metallurgy in Australia—Non-Ferrous Metallurgy. v. IVB.** Frank A. Green, editor. 272 p. Australasian Institute of Mining and Metallurgy, 399 Little Collins Street, Melbourne, Australia. £A 1 5s, unbound; £A 1 15s bound.

Mainly devoted to extraction of lead and silver, zinc, copper, cadmium, antimony, aluminum, and sulphur. Details of final products and firms who process these metals, and refractories used in the Australian copper and lead smelting and refining industries. (C general, Pb, Ag, Zn, Cu, Cd, Sb, Al)

52-C. (Book—German.) **(Clay and Aluminum. Results Gained by Practical Experience. 1920 to 1952. 2nd part: Aluminum). Tonerde und Aluminium. Ergebnisse und Erfahrungen aus der Betriebspraxis, 1920-1952. Zweiter Teil: Das Aluminium.** Wilhelm Fulda and Hans Ginsberg. 353 p. 1953. Walter de Gruyter & Co., Berlin W35, Germany. DM44.

A comprehensive survey of all chief processes involved in extraction and refining of aluminum. (C general, Al)

D
Ferrous Reduction and Refining

61-D. Pneumo-Hydraulic Control of Blast Furnace Blowers. *Engineering,* v. 176, Dec. 11, 1953, p. 761-762.

Resistance to passage of hot air supply and its regulation. Photograph, diagram. (D1)

62-D. Emissivity and Flame Length. M. W. Thring. *Iron & Steel,* v. 26, Dec. 11, 1953, p. 581-585; disc., p. 655-658.

Abridged from Iron and Steel Institute paper. Effect on heat transfer in openhearth furnace. Diagrams, graphs. (D2)

63-D. Belt-Charged Blast Furnaces of S. A. John Cockerill, Belgium. G. Hookham. *Iron and Steel Institute, Journal,* v. 175, Dec. 1953, p. 409-419.

Briefly reviews reasons for adopting belt system and installation. Shows how new problems in design and practical operation were solved. Diagrams, photographs. (D1)

64-D. The Refractories Association of Great Britain: The Historical Development of Refractory Materials Used in the Basic Open Hearth Furnace. H. R. Lahr. *Refractories Journal,* v. 29, Dec. 1953, p. 505-512.

Presented at a meeting of the Refractories Association of Great Britain, Middlesborough, Nov. 1953. (D2)

65-D. British Ceramic Society: Symposium on Casting Pit Refractories. *Refractories Journal,* v. 29, Dec. 1953, p. 513-517.

Summaries of papers presented at the Autumn Meeting of the Refractory Materials Section, Nov. 1953, London. Includes "A Statistical Investigation Into Factors Affecting the Life of Ladle Linings", N. H. Bacon and J. E. Andrew; "Steel Ladle Trials on Fireclay Bricks", H. R. Lahr; "Laboratory Tests for the Assessment of Ladle Bricks", J. Mackenzie; "Performance of Continental Ladle and Runner Bricks", G. van Gijn; and "Note on the Relationship Between Bulk Density and Thermal Conductivity in Refractory Insulating Bricks", K. W. Cowling, A. Elliott and W. T. Hale. (D9)

66-D. Pozzolanic Cements From Blast Furnace Slag. R. C. Lied, J. H. Handwerk and T. N. McVay. *Rock Products,* v. 56, Dec. 1953, p. 130, 136.

Includes tables. **(D1, A8)**

67-D. Conditions Favor Six-Electrode Furnace. *Steel,* v. 134, Jan. 11, 1954, p. 77-78.

Reports trend toward elliptical units having 6-point distribution of B.t.u. into metal bath. Photograph. (D5)

68-D. Plant, Operation, and Economics of Oxygen (Converter) Steelworks. K. Rösner. Henry Brutcher, Altadena, Cal., Translation no. 3006, 16 p. + 1 plate. (Condensed from *Stahl und Eisen,* v. 72, no. 17, 1952, p. 997-1004.)

Previously abstracted from original. See item 360-D, 1952. (D3, ST)

69-D. Stringers in Stainless Steel. O. Krifka. Henry Brutcher, Altadena, Cal., Translation no. 3059, 12 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 1, 1952, p. 39-42.)

Practical study of best ways of minimizing harmful nonmetallic inclusions (macro and micro-slags) in stainless steel, specifically 18% chromium steel. Micrographs. 10 ref. (D9, SS)

70-D. Loss of Alloying Elements of Steel During Oxygen Refining in the Basic Arc Furnace. I. E. Pachaly. Henry Brutcher, Altadena, Cal., Translation no. 3146, 14 p. + 1 plate. (From *Stahl und Eisen,* v. 73, no. 8, Apr. 8, 1953, p. 461-469.)

Previously abstracted from original. See item 253-D, 1953. (D5, Ni, W, V, Mo, Cu, Co)

71-D. Loss of Alloying Elements of Steel During Oxygen Refining in the Basic Arc Furnace. II. E. Pachaly. Henry Brutcher, Altadena, Cal., Translation no. 3147, 19 p. + 1 plate. (From *Stahl und Eisen,* v. 73, no. 8, 1953, p. 465-469.)

Successful remelting of chromium-manganese stainless scrap with use of oxygen in the basic arc furnace. Data on manganese recovery. Graphs, tables. 9 ref. (D5, SS)

72-D. (Polish.) **Combustion Areas in Front of the Blast Furnace Tuyeres.** Wladyslaw Kuczewski and Kazimierz Moszoro. *Hutnik,* v. 20, no. 12, Dec. 1953, p. 361-367.

Theoretical and practical importance of the Czyzewski pattern for the blast furnace process. Influence of temperature and pressure on velocity of coke consumption. Tables, diagrams, graphs. 8 ref. (D1)

73-D. Regenerator Efficiency and Air Preheat in the Open Hearth. B. M. Larsen. *American Iron and Steel Institute, Preprint,* Oct. 21, 1953, 50 p.

Paper presented at Birmingham Regional Technical Meeting of AISI, Oct. 21, 1953. Data based on tests for regenerator efficiency made on three operating openhearth furnaces which represent about the extremes of present operating practices. Diagrams, tables, graphs. (D2)

74-D. Practical Aspects of Structure and Segregation in Killed Steel Ingot Solidification. Edward A. Loria and Richard L. Keller. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 45-51.

Internal soundness and segregation of electric furnace killed steel ingots have been illustrated in terms of grade, ingot size, and cooling rate. Photographs, table. 19 ref. (D9, CN)

75-D. Relining and Enlarging No. 9 Blast Furnace at Appleby-Frodingham. G. D. Elliot, A. Bridge, E. Jarvis and T. E. Mitchell. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 52-56.

Daily account of relining and enlarging of a blast furnace. (D1)

76-D. Blast Furnace Flue Dust Thickeners. J. D. Walker and E. N. Hower. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 57-61.

Method of reducing total suspended solids in overflow. Drawings, table, photographs. (D1)

77-D. Report on West Coast Steel Plants, 1953. Thomas A. Dickinson. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 62-66, 69.

Includes photographs. (D general)

78-D. Compressed Air. An Answer to Heavy-Duty Arc Furnace Switching. J. E. Schrameck and J. K. Walker. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 67-69.

Heavy-duty circuit breakers. Photographs, diagrams. (D5)

79-D. Design and Manufacture of Ingot Molds. John H. Shank. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 70-72.

Design of molds at the Colorado Fuel and Iron Corp. and experiences in arriving at a design to fulfill over-all requirements of the several end products. Diagrams. (D9)

80-D. Electrical Developments in 1953. W. E. Miller. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 73-82.

Developments in steelmaking; blooming and slabbing mills; hot strip mills; rod and skelp mills; tandem cold strip molds; and single stand cold reduction mills. Graphs, photographs, diagrams. (D general, F23, ST)

81-D. Value of Blast Heat in Blast Furnace Operation. Charles E. Agnew. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 90.

Economic and operating advantages of using hot blast. Table. (D1)

82-D. The Firing of Open Hearth Furnaces. G. Reginald Bashforth. *British Steelmaker,* v. 20, Jan. 1954, p. 18-21.

Important considerations determining choice of appropriate fuel. Comparative data on American and German fuel policy and practice. Diagram, graphs. 17 ref. (D2)

83-D. Blast Furnace Blower Control. *British Steelmaker,* v. 20, Jan. 1954, p. 24-25, 27-28.

Grid-controlled mercury arc rectifier used in conjunction with standard pneumatic regulators to control speed of electrically driven blast furnace blowers, providing reliable and flexible method of regulating automatically volume of air supplied to two furnaces. Photographs, graphs, diagrams. (D1)

84-D. Smoke, Dust, Fumes Closely Controlled in Electric Furnaces. R. S. Coulter. *Iron Age,* v. 173, Jan. 14, 1954, p. 107-110.

Better working conditions, improved community relations, lower maintenance costs have resulted from use of improved smoke control equipment on electric furnaces operated by Bethlehem Pacific Coast Steel Corp. at Los Angeles. From 12,000 to 20,000 lb. of dust are collected daily. Photographs, graphs, diagram, oscillograph, table. (D5)

85-D. Newer Types of Metallic Recuperators. H. Weineck. *Iron & Steel,* v. 27, Jan. 1954, p. 23-25.

Recent installations. Photographs. 10 ref. (D2)

86-D. Iron Ores. C. Rekar. *Iron & Steel,* v. 27, Jan. 1954, p. 31-32. (Abridged from *Stahl und Eisen,* v. 73, Aug. 13, 1953, p. 1094-1101.)

Previously abstracted from original. See item 353-D, 1953. (D general, B22, Fe)

87-D. Reaction Equilibria Between Metal and Slag in Acid and Basic Open-Hearth Steelmaking. E. T. Turkdogan and J. Pearson. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954. p. 59-63.

Study of extent of equilibrium between metal and slag with respect to reactions involving manganese, phosphorus, ferrous oxide and carbon. Graphs. 17 ref. (D2, ST)

88-D. Steelworks Waste-Heat Boiler Practice. R. McDonald. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 71-88.

Historical background, design and layout of plants and operational conditions. Investigations into further extraction of heat after waste gases leave boiler. Operational details derived from an economizer recently installed to operate in series with waste-heat boiler. Diagrams, graphs, oscillographs, photograph. 7 ref. (D general)

89-D. Elliptical Electric Furnace Outperforms Conventional Circular Type. James K. Preston. *Journal of Metals,* v. 6, Jan. 1954, p. 18-20.

Reports higher melting rate and lower power input. Table, graph, photograph. (D5)

90-D. Induction Stirring Provides Better Control of Operating Techniques. Harry F. Walther. *Journal of Metals,* v. 6, Jan. 1954, p. 21-23.

Installation and maintenance of equipment and production of stirred steel. Discusses hearth erosion. Photograph. (D6, ST)

91-D. 17 Years of Stirring History Shows International Exchange of Ideas. Eric G. Malmlow. *Journal of Metals,* v. 6, Jan. 1954, p. 24.

Abstract of paper presented at the AIME Electric Furnace Steel Conference, Cincinnati, Dec. 1953. History of developments in technique of induction stirring. 6 ref. (D6)

92-D. Closed Electric Reduction Furnaces Permit Utilization of Furnace Gas. M. O. Sem. *Journal of Metals,* v. 6, Jan. 1954, p. 30-32.

Techniques with various types of furnaces. Tables, photographs. (D8)

93-D. Optimum Composition of Blast Furnace Slag as Deduced From Liquidus Data for the Quaternary System CaO-MgO-Al_2O_3-SiO_2. E. F. Osborn, R. C. DeVries, K. H. Gee and H. M. Kraner. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 33-45.

Results of experimental studies. Phase diagrams, tables, photograph. 19 ref. (D1, B21)

94-D. Radioactive Tracers for Tagging Special Steel Melts. David L. Douglas. *Nucleonics,* v. 12, Jan. 1954, p. 16-18.

Radioisotopes offer several advantages over customary chemical analysis. Time involved is negligible, little plant space is necessary and melt identification is definite. Tables. 4 ref. (D general, S19, ST)

95-D. Progress in Steelmaking Costs Favor Electrics in Cold Metal Shops. L. F. Reinartz and H. C. Barnes. *Steel,* v. 134, Jan. 25, 1954, p. 96, 98-99.

From paper presented at the Philadelphia Regional Technical Meeting of the American Iron and Steel Institute. Reports that in contrast with low-fuel efficiency and cheap fuel in the openhearth, the electric furnace is characterized by high efficiency and expensive energy. Tables, photograph. (D5, CN)

96-D. Steel's Newest Frontier. *Utilization,* v. 8, Jan. 1954, p. 20-24.

Tremendous expansion of industry exemplified by one plant. Photographs. (D general)

97-D. (French.) Attempts to Improve the Duration of Converter Bottoms and Linings. M. Calaque. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1953, no. 12, p. 1915-1922.

Results of tests with baking tar held at 110° C. for 24 hr. Describes tests with dolomites. Tables, graphs. (D3)

98-D. (French.) Control of the Slag in Basic Open-Hearth Furnaces. M. Bernard. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1953, no. 12, p. 1923-1934.

Four methods for determining chemical composition. Diagrams, photographs. (D2)

99-D. (French.) Contribution to the Study of Dolomite Refractories for Thomas Converters. Paul Metz. *Revue universelle des mines,* v. 9, ser. 9, no. 12, Dec. 1953, p. 809-831.

Studies were made of wear of the linings and bottoms of basic bessemer converters. Photographs, tables, graphs, diagrams. 18 ref. (D3)

100-D. (French.) Bottoms of Thomas Converters. Laboratory Study. R. Gregoire and A. Decker. *Revue universelle des mines,* v. 9, ser. 9, no. 12, Dec. 1953, p. 831-834.

Experiments were conducted to determine action of carbon in presence of slag in bessemer process. Photographs, diagram, table. (D3)

101-D. (German.) Comparison of American and German Basic Open-Hearth Furnaces. Arno Ristow. *Stahl und Eisen,* v. 73, no. 24, Nov. 19, 1953, p. 1574-1582; disc., p. 1582-1583.

Includes percentage of total steel production, number and capacity of furnaces, annual capacity of steel mill, type of heating, quality of steel, and furnace linings. Tables, graphs, diagrams. 15 ref. (D2, ST)

102-D. (German.) The Burner Designs of Maerz Furnaces. Wilhelm Schmitt. *Stahl und Eisen,* v. 73, no. 25, Dec. 3, 1953, p. 1640-1643; disc., p. 1643-1644.

Details of flow conditions in 13 openhearth furnaces. Results indicate importance of draft conditions and air and gas feed. Tables, diagrams. 8 ref. (D2)

103-D. (German.) Experiences With Ingot-Mold Lacquers. Georg Kowarsch. *Stahl und Eisen,* v. 73, no. 25, Dec. 3, 1953, p. 1654-1656; disc., p. 1656-1657.

Properties of "Randite" and "Helios" lacquers. Tables, diagram. 4 ref. (D9)

104-D. (German.) Coreless Induction-Furnace Plant of 12-Ton Capacity in the Steel Mill Kilsta (Sweden). Tage Hahn. *Stahl und Eisen,* v. 73, no. 25, Dec. 3, 1953, p. 1658-1659.

Design and operation. Photograph. (D6, ST)

105-D. (German.) Avoiding Furnace Sows in Blast-Furnace Operation. Hermann Hold and Bernhard Weilandt. *Stahl und Eisen,* v. 73, no. 26, Dec. 17, 1953, p. 1727-1728.

Recommends cooling the outside of the refractory brick with water. (D1)

106-D. (German.) On the Improvement of Basic Bessemer Steel. Hans Kosmider. *Stahl und Eisen,* v. 73, no. 26, Dec. 17, 1953, p. 1729.

Attempts to reduce nitrogen, phosphorus, and sulfur content of steel with oxygen-enriched blast. (D3, CN)

107-D. Large High-Frequency Furnaces. *Foundry Trade Journal,* v. 96, Jan. 21, 1954, p. 73-74.

New 12-ton steel melting units. Photographs. (D6, ST)

108-D. Refractory Types and Applications. H. A. Robertson. *Iron and Steel Engineer,* v. 31, Jan. 1954, p. 86-89.

Selection of right refractories for varied steel plant applications requires good engineering judgment. (D general, F general, J general)

109-D. Electric Furnace vs. Open Hearth in Cold Metal Shops. L. F.

Reinartz and H. C. Barnes. *Iron and Steel Engineer,* v. 31, Jan. 1954, p. 114-119.

From paper presented at Philadelphia Regional Technical Meeting of AISI, Dec. 3, 1953. Fuel, material handling, steel quality and economic considerations. Tables. (D5, D2)

110-D. Progress in Steelmaking. Better Distribution With High Speed Tops. *Steel,* v. 134, Feb. 1, 1954, p. 96, 99.

Reports increased blast furnace efficiency by adapting small bell hoppers for fast rotation during filling. Photographs, table. (D1, CI)

111-D. (French.) **Induction Mixing in the Electric Arc Furnace Bath.** *Journal du Four Electrique,* v. 62, no. 6, Nov.-Dec. 1953, p. 165-168.

Advantages for steel producing furnaces. Diagrams, photograph. (To be continued.) (D5, ST)

E Foundry

70-E. Blow-In Core Driers Used for Close Tolerances. *American Foundryman,* v. 25, Jan. 1954, p. 40-43.

By combining two established molding methods in one casting operation, aluminum core driers can be produced with such smooth finish as to minimize machining and tooling in cavities. Process uses conventional green sand molding for cope and cheek, permanent mold for drag. Photographs. (E19, E12, Al)

71-E. Foundry Facts. Chill Testing of Cast Iron. *American Foundryman,* v. 25, Jan. 1954, p. 65-66.

Data sheet for wedge and chill test procedures. Diagrams, table. (E25, CI)

72-E. Carbon Equivalent and Fluidity. E. R. Evans. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Dec. 1953, p. 118-123.

Fluidity of hypo-eutectic cast irons at any temperature increases with carbon equivalent until a critical value is reached. Graphs, tables. 7 ref. (E25, CI)

73-E. Shell Moulding Machine. *Engineer,* v. 196, Dec. 25, 1953, p. 847.

Equipment and operating procedures. Photographs. (E16)

74-E. Continuous Flow From Casting Through Shipping. *Flow,* v. 9, Jan. 1954, p. 82-85.

A single building with foundry and machine operations, quality control, packaging and shipping are all integrated into one big process. Diagram, photographs. (E general, G17, S12, A5)

75-E. Application of Shell Moulding to Steel Castings. C. Hand and P. R. Beeley. *Foundry Trade Journal,* v. 95, Dec. 17, 1953, p. 745-747, 759.

Discussion by actual producers concerning capabilities of process. Photographs. (E16, CI)

76-E. Experiences in the Exothermic Feeding of Grey-Iron Castings. J. Grice. *Foundry Trade Journal,* v. 95, Dec. 17, 1953, p. 749-757; disc., p. 757-758.

Developments and techniques which contribute to more economical, high-quality castings. Photographs, diagrams. (E23, CI)

77-E. Experiences in Degassing Aluminium Alloys. D. P. Sparham and E. A. Moult. *Foundry Trade Journal,* v. 95, Dec. 24, 1953, p. 777-781.

Early casting practices and degassing methods. Establishment of present practice and results obtained with new technique. Photographs, table. (E25, Al)

78-E. Practical Experience of Shell Moulding. C. Potter. *Foundry Trade Journal,* v. 95, Dec. 24, 1953, p. 783-785.

Includes photograph. (E16)

79-E. Metal Corebox Construction. F. H. Wakeham. *Foundry Trade Journal,* v. 95, Dec. 24, 1953, p. 789-790.

Advantages over wood, and design, construction and machining. Diagrams. (E21)

80-E. The Investril System of "Lost-Wax" Precision Casting. *Machinery (London),* v. 83, Dec. 18, 1953, p. 1207-1209.

A system converting a high production process to producing medium as well as small quantities economically. Photographs, drawing. (E15)

81-E. Quality Control Applied to Die Casting. H. R. Haag. *Machinery (London),* v. 83, Dec. 25, 1953, p. 1263-1268.

Advantages of checking samples and necessity of proper test equipment. Table, micrograph, photographs. (E13, S12)

82-E. Designing Die Casting Dies for High-Speed Operation. H. K. Barton. *Machinery (London),* v. 83, Dec. 25, 1953, p. 1268-1276.

Consideration of die temperature ranges for satisfactory casting. Graph, charts, diagrams. (E13)

83-E. Type Founding. *Metal Industry,* v. 83, Dec. 11, 1953, p. 477-480.

Gages, molds and techniques of molding. Photographs. (E19)

84-E. Foundry Briefs: Sub-Cutaneous Porosity. *Metal Industry,* v. 83, Dec. 25, 1953, p. 525-526.

Factors influencing porosity in leaded nickel-bronze. Reports two alloys having similar though slightly different characteristics will not necessarily respond identically to the same founding conditions. Photograph, micrographs. (E25, Pb, Ni, Cu)

85-E. Metal Casting Methods. IX. Cleaning and Fettling Practice. J. B. McIntyre. *Metallurgia,* v. 48, no. 290, Dec. 1953, p. 273-276.

Operations necessary, after casting has been removed from mold, to prepare it for shipment to customer. Includes cleaning off adherent sand and removal of surplus metal. Photographs, table. (E24)

86-E. You Can Use Lead Where Precision Dimensions and Weight Are Needed. J. B. Lazarus. *Precision Metal Molding,* v. 12, Jan. 1954, p. 38-39, 91.

Advantages of rubber molds and centrifugal casting of lead. Photographs. (E14, Pb)

87-E. Mercast Valve Body Shows How Booking Allows More Design Latitude. *Precision Metal Molding,* v. 12, Jan. 1954, p. 40-42.

New casting technique using frozen mercury patterns. Photographs, drawings. (E17, E15)

88-E. Metallic Sealing Compounds Can Be Used for Production Impregnation. *Precision Metal Molding,* v. 12, Jan. 1954, p. 59-60, 72-74.

Typical examples and results that have been achieved. Photographs. (E25)

89-E. Determination of Fluidity of Metals in Casting by Means of a Spiral Shell Mold. P. Schneider. Henry Brutcher, Altadena, Cal., Translation no. 3049, 6 p. + 1 plate. (From *Giesserei, Technisch-Wissenschaftliche Beihefte,* 1952, nos. 6-8, p. 379-381.)

Brief review of methods currently in use and their drawbacks. Photographs, diagrams, graph. 5 ref. (E16, E25)

90-E. (Dutch.) **Electric Furnaces for the Iron Foundry.** *Bedrijf en Techniek,* v. 8, no. 190 (25), Dec. 1953, p. 540-541.

Use and energy consumption of various electric melting and heat treating furnaces. Photographs. (E10, J general, CI)

91-E. (German.) **Zinc Alloys as Casting Materials.** G. Lieby. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 856-860.

Properties of zinc alloys and common methods of casting. Practical application of zinc pressure casting. Tables, diagrams, photographs. (E general, E13, Q general, Zn)

92-E. (Hungarian.) **The Basic Cupola.** Ferenc Varga. *Ontöde,* v. 4, no. 10, Oct. 1953, p. 205-213.

Different methods of desulfurization processes and development of basic-lined cupola. Operation and costs. Tables, graphs, diagrams. 20 ref. (E10, Mn, Mg, Cr, Ni, Mo, Cu)

93-E. (Hungarian.) **Modern Cleaning of Castings. II.** György Szvath. *Ontöde,* v. 4, no. 10, Oct. 1953, p. 216-218.

Dust collector installations in foundries and on polishing machines. Diagrams. (E24, L10)

94-E. (Hungarian.) **Copper Alloy Test Bar Cast in Sand.** Sandor Polgary. *Ontöde,* v. 4, no. 12, Dec. 1953, p. 248-249.

Proposes new method for casting test bars of special copper alloys. Results of method. Tables, diagrams. (E11, Cu)

95-E. (Hungarian.) **Improving the Quality of Castings by Decreasing the Extent of Burning on of Mold Parts.** Andras Toth. *Ontöde,* v. 4, no. 12, Dec. 1953, p. 254-257.

Significance of refractoriness of foundry sands and their grain size. Practical suggestions for cleaning castings and testing composition of sands as well as determining grain size. (E18, E24)

96-E. (Russian.) **New Tendencies in the Construction of Pouring Systems for Casting Under Pressure.** V. M. Pliatskii. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 5-8.

Suggestions for obtaining castings with well-defined edges, precise contours and a minimum of porosity caused by air. Photographs, diagrams. (E23)

97-E. (Russian.) **Rational Cycle of the Impact Molding Machine.** L. A. Izrailevich. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 9-11.

Theoretical presentation. Graphs. 4 ref. (E19)

98-E. (Russian.) **Test in the Application of Water Glass in Production of Foundry Molds.** P. I. Shportenko. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 17-18.

Application resulted in clean, strong molds. Tables. (E19)

99-E. (Russian.) **Chill Casting of Large Parts From Al-2 Alloy.** K. N. Osminkin and B. D. Krifuks. *Liteinoe Proizvodstvo,* 1953, no. 9, Aug., p. 19-20.

Production model of a chill mold with a flexible metallic core securing free shrinkage in large castings. Photographs, diagrams. (E19, Al)

100-E. (Russian.) **Six-Spindle Centrifugal Machine for Casting Bronze Bushings.** D. M. Krymskii and N. I. Mishchenko. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 27-28.

Machine decreased rejects 2 to 3% and increased yearly output. Table, diagrams. (E14, Cu)

101-E. Pressure Die-Casting Review. Die-Castings in the "Bendix" Washer. Brass Die-Casting Furnace. *Metal In-*

dustry, v. 84, Jan. 8, 1954, p. 27-29.
Includes photographs, diagrams. (E13)

102-E. Founding Magnesium-Base Alloys. I. Shrinkage Porosity. M. Caillon. *Metal Industry*, v. 84, Jan. 1, 1954, p. 3-5.
Effects of shrinkage porosity. Chilling methods. Diagrams, photograph, graphs. (To be continued.) (E23, E25, Mg)

103-E. (German.) Equipping a Modern Laboratory With Air Conditioning. Erich Piper and Heinz Hagedorn. *Stahl und Eisen*, v. 73, no. 26, Dec. 17, 1953, p. 1720-1727.
Design and equipment of a modern foundry laboratory. Special emphasis is given to air conditioning. Diagrams, tables, graph, photographs. (E general, A9)

104-E. Dimensioning Castings. Elvin V. Lundstedt. *Machine Design*, v. 26, Jan. 1954, p. 98-110.
Recommendations for correct detail specifications on casting drawings to insure feasibility, low cost, and ease of manufacture. Photographs, drawings, diagrams. (E general)

105-E. Progress in Steelmaking. Rollmaking Art Goes Modern. *Steel*, v. 134, Jan. 18, 1954, p. 82, 84, 87.
Developments in equipment and techniques for casting steel mill rolls. Photographs, diagrams. (E11, CI)

106-E. Modern Casting Techniques. H. J. Meerkamp van Embden. *Philips Technical Review*, v. 15, Nov. 1953, p. 133-146.
Survey of development of metal casting. Sand, permanent metal mold, Croning, and lost-wax processes. Diagrams, photographs. 9 ref. (E11, E12, E15, E16)

107-E. Plastic Patterns. W. C. H. Dunn. *Canadian Metals*, v. 17, Jan. 1954, p. 26, 28-29.
Cast plastic patterns are not new, but their use was hindered by wartime shortages of resin and lack of know-how. Advantages are apparent in several different fields of application. Photographs, table. (E17)

108-E. Production Shell Moulding. *Mechanical World and Engineering Record*, v. 134, Jan. 1954, p. 20-22.
Accuracy and high rate of output from systematized machine process. Photographs. (E16)

109-E. Clamping Shell Moulds. Dennis Brooks. *Canadian Metals*, v. 17, Jan. 1954, p. 24.
Includes diagram, illustrating method of clamping. (E16)

110-E. Founding Magnesium-Base Alloys. II. Methods of Chilling. M. Caillon. *Metal Industry*, v. 84, Jan. 8, 1954, p. 25-26.
Use of special sands of good thermal conductivity. Photographs, diagrams, graphs. 1 ref. (To be continued.) (E18, E23, Mg)

111-E. Foundry Prepares Own Refractory for Lining and Patching Cupolas. Herbert F. Scobie. *American Foundryman*, v. 25, Feb. 1954, p. 46-48.
Practice based on mixture that is used not only for daily patching but also for lining the cupola. Material is more economical than previous linings used and gives better metal control due to reduced burnout. Photographs, diagram. (E10)

112-E. New Mechanized Foundry Casts Permanent Magnets. *American Foundryman*, v. 25, Feb. 1954, p. 58-59.
General Electric's Carboloy Department, one of the world's most modern plants for the production of Alnico permanent magnets. Photographs. (E11, SG-n, Ni)

113-E. How Far Should We Go in Foundry Sand Control. Earl E. Woodliff. *American Foundryman*, v. 25, Feb. 1954, p. 60-65.
Sand control becomes increasingly complex as more sand additives and test methods are developed. A foundryman can go as far as he likes in controlling sands but he will always profit by observing well-established fundamentals in his molding operations. Photographs, table. (E18)

114-E. Magnesium Die Casting. G. F. Hodgson. *Foundry*, v. 82, Feb. 1954, p. 102-105, 252-256.
Light weight, good machinability, price and availability have put this metal on par with aluminum. Table, diagram, photographs. (E13, Mg)

115-E. The Foundryman Considers Quality. E. J. Jory. *Foundry*, v. 82, Feb. 1954, p. 112, 195, 198.
Means of improving quality and reasons for their adoption. (E25)

116-E. Casting Defects. Their Causes and Remedies. W. M. Halliday. *Foundry*, v. 82, Feb. 1954, p. 113, 183-184, 186, 188.
Common defects and recommendations for their elimination. (E25)

117-E. Mammoth Aluminium Wheel. J. R. Harrison. *Foundry Trade Journal*, v. 95, Dec. 31, 1953, p. 801-805.
Methods adopted for casting four aluminum alloy half-wheel castings of finished net weight 2,250 lb. each. Photographs, diagrams, table. (E11, Al)

118-E. Master Patternmaking Aids Production. H. Wilson. *Foundry Trade Journal*, v. 96, Jan. 7, 1954, p. 5-11.
Equipment and techniques employed. Photographs, diagrams. (To be continued.) (E17)

119-E. Control in an Investment Foundry. D. F. B. Tedds. *Foundry Trade Journal*, v. 96, Jan. 14, 1954, p. 37-42; Jan. 21, 1954, p. 77-80; disc., p. 80-82.
Layout and operation of a fully integrated high-production unit. Photographs. 2 ref. (To be continued.) (E15)

120-E. Special Report: Shell Molding Brings New Foundry Era. *Iron Age*, v. 173, Jan. 28, 1954, p. 55-57.
Equipment and processes in use, resulting in improved casting quality and cost reduction. Diagrams, photographs. (E16)

121-E. Foundry Core Sand Delivered by Air. E. J. Egan, Jr. *Iron Age*, v. 173, Jan. 21, 1954, p. 97-99.
Pneumatic system delivers sand from preparation centers to coremaking machine. Photographs, diagram. (E18)

122-E. New Techniques Shorten Investment Casting Cycle. W. G. Patton. *Iron Age*, v. 173, Jan. 28, 1954, p. 115-117.
Process offers all advantages of lost wax process plus relatively high production per man-hour. Photographs. (E15)

123-E. Solidification of Steel. IV. Casting Methods. T. B. King. *Iron & Steel*, v. 27, Jan. 1954, p. 15-22.
Developments in centrifugal casting, investment casting, shell molding and continuous casting. Table. 81 ref. (E14, E15, E16, D9, CI)

124-E. Pressure-Pouring Steel Car Wheels. E. Q. Sylvester. *Mechanical Engineering*, v. 76, Feb. 1954, p. 152-158.
New process involves permanent molds machined from graphite. Photographs, table, diagrams, graph, photomicrographs. (E12, CI)

125-E. Founding Magnesiuum-Base Alloys. III. Risers. M. Caillon. *Metal Industry*, v. 84, Jan. 15, 1954, p. 43-45.
Design of and need for risers. Diagrams. (To be continued.) (E22, Mg)

126-E. Foundry Briefs. Cracks in Phosphor Bronze Wheel. *Metal Industry*, v. 84, Jan. 15, 1954, p. 46.
Probable contributing factors. Micrographs. (E25, Cu)

127-E. Founding Magnesium-Base Alloys. IV. Casting Design. M. Caillon. *Metal Industry*, v. 84, Jan. 22, 1954, p. 70-72.
Diagrams, graphs. (To be continued.) (E general, Mg)

128-E. Investment Casting. When and How to Use It. Edward Engel. *Tool Engineer*, v. 32, Feb. 1954, p. 77-80.
Production and design problems. Photographs. (E15)

129-E. Economics of Investment Casting—Benefits and Limitation of Process Evaluated. Allen O. Smith. *Western Metals*, v. 12, Jan. 1954, p. 60-62.
Equipment, techniques and factors affecting economics of process. Photographs. (E15)

130-E. Convection in Molten Metals. L. I. Sokol'skaya. Henry Brutcher, Altadena, Cal., Translation no. 2457, 13 p. (From *Izvestiya Akademii Nauk SSSR, Otd. Tekh. Nauk*, 1949, no. 9, p. 1365-1371.)
Previously abstracted from the original. See item 54-E, 1950. (E23)

131-E. Device for Determining the Fluidity and Rate of Flow of a Stream of Liquid Metal. L. L. Kunin. Henry Brutcher, Altadena, Cal., Translation no. 2516, 4 p. (From *Zavodskaya Laboratoriya*, v. 15, no. 7, 1949, p. 870-872.)
Previously abstracted from the original. See item 14A-167, 1949. (E25)

132-E. (French.) Investigation of Microporosity in Castings of Magnesium Alloys. Marcel Bardot. *Fonderie*, 1953, Nov., no. 94, p. 3687-3692.
Results of experiments investigating factors causing microporosities of magnesium alloys. Micrographs, diagrams, tables. 8 ref. (E25, Mg)

133-E. (Book.) A Handbook on Die Casting. F. D. Penny. 78 p. Her Majesty's Stationery Office, York House, Kingsway, London W.C. 2, England. 6s.
A service handbook to assist designers and those concerned with inspection and acceptance of die-cast parts.
(E13, Al, Mg, Sn, Pb, Cu, Fe)

134-E. (Book—French). (Practical Guide to the Designing of Steel Castings.) Guide Practique du Tracé des Pieces en Acier Moulé. Ed. 2. 64 p. Editions Techniques des Industries de la Fonderie, 12, Avenue Raphael, Paris 16. 40 fr.
Essential rules for producing sound castings economically. General properties of steel castings and chief defects due to poor design. (E general, CI)

F
Primary Mechanical Working

60-F. Soaking Pit Practice at the Normanby Park Steelworks of John Lysaght Ltd. A. H. Norris. *Iron and Steel Institute, Journal*, v. 175, Dec. 1953, p. 353-359.
Results of three years' experience of working a battery of one of the first postwar installations of one-way

top-fired soaking pits. Results show how modern advances in instrumentation and construction have a considerable effect on heating efficiency, in regard to both heat consumption and quality of steel. Photographs, graphs, tables. (F21)

61-F. 'Very Thin' Magnesium Strips Produced by Modified Hot Rolling. L.V. Martikonis. *Light Metal Age,* v. 11, Dec. 1953, p. 14-15.

Electric current applied so that magnesium strip is the resistance element and the controlled flow of current developed desired temperature. Photographs. (F23, Mg)

62-F. Upset Forging. *Metal Trends,* v. 1, no. 4, 1953, p. 6-9.

Today's modern upset machines save weight, freight and money. Diagram, photographs. (F22)

63-F. Drop Forging. Ralph H. Eshelman. *Tool Engineer,* v. 32, Jan. 1954, p. 73-82.

Process and equipment supplementary operations, materials, costs, die design and recent developments. Photographs, diagrams, graphs, tables. (F22)

64-F. The Role of the Laboratory in Steel Wire Manufacture. W. A. Sandilands. *Wire Industry,* v. 20, Dec. 1953, p. 1177-1179, 1181-1182.

Control of raw materials and processes, research and development, reviews and statistical control, assistance to sales department and standards and specifications. 6 ref. (F28, S12, CN)

65-F. Straightening of Rolling Mill Products. E. Siebel. Henry Brutcher, Altadena, Cal., Translation no. 2815, 10 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 21, 1952, p. 1298-1301.)

Previously abstracted from original. See item 323-F, 1952. (F29)

66-F. Steels for Large Forgings. S. Ammareller and P. Grün. Henry Brutcher, Altadena, Cal., Translation no. 3012, 23 p. + 2 plates. (Condensed from *Stahl und Eisen,* v. 72, no. 12, 1952, p. 653-662; disc., p. 662.)

Previously abstracted from original. See item 217-F, 1952. (F22, D9, Q23, ST)

67-F. Friction, Wear, and Lubrication in Wire Drawing. W. Papsdorf. Henry Brutcher, Altadena, Cal., Translation no. 3050, 20 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 8, 1952, p. 393-399.)

Previously abstracted from original. See item 139-F, 1952. (F28, Q9)

68-F. Effect of Processing Conditions on the Properties of Heavy Forgings for Steam Turbines. R. Schinn. Henry Brutcher, Altadena, Cal., Translation no. 3077, 18 p. + 2 plates. (Condensed from *Stahl und Eisen,* v. 72, no. 12, 1952, p. 676-683.)

Previously abstracted from original. See item 218-F, 1952. (F22, D9, J26, Q general, S13, ST)

69-F. Causes of Fine Surface Defects in the Hot Working of Plain Carbon Steel. H. Buchholtz and R. Pusch. Henry Brutcher, Altadena, Cal., Translation no. 3100, 23 p. + 2 plates. (From *Stahl und Eisen,* v. 73, no. 4, Feb. 12, 1953, p. 204-212.)

Previously abstracted from original. See item 137-F, 1953. (F21, CN)

70-F. Investigation of Pressures and Work Required in the Cold Extrusion of a Number of Steels. H. D. Feldmann. Henry Brutcher, Altadena, Cal., Translation no. 3138, 16 p. + 4 plates. (From *Stahl und Eisen,* v. 73, no. 3, 1953, p. 165-174.)

Previously abstracted from original. See item 115-F, 1953. (F22, ST)

71-F. Metal Soaps (Stearates) for the Drawing of Steel Wire. K. Schimz. Henry Brutcher, Altadena, Cal., Translation no. 3165, 4 p. (From *Draht,* [*German Ed.*], v. 4, no. 8, 1953, p. 297.)

Nature of metal soaps studied, data on their melting point, bulk density and ignition residue. Best soaps for ordinary low-carbon steels and for high-grade and alloy steels. Table. (F28, AY)

72-F. (German.) **Ingot Holders of Metal-Extrusion Presses.** H. M. Hiller. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 993-1000.

Method of determining important data on designing ingot holders. Inserts can be varied and adapted to plant requirements by varying degree of shrink fitting. Tables, diagrams, graphs. 5 ref. (F24, Cr, W, AY)

73-F. (German.) **Designing and Producing Large Forgings.** H. Gummert. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 95, no. 34, Dec. 1, 1953, p. 1141-1145.

Forging machines, materials, heat treating and shaping of different types of large forgings. Practical suggestions on procedure and testing. Tables, graphs, diagrams, photographs. 3 ref. (F22, J general, AY)

74-F. Speed, Control and Uniformity in Soaking Pit Heating. P. F. Kinyoun. *American Iron and Steel Institute, Preprint,* Oct. 1, 1953, 11 p.

Paper presented at Youngstown Regional Technical Meeting of AISI, Oct. 1, 1953. Design of the pits; shape, size, composition and physical condition of the charge; type of fuel used; and final use of the product. Tables, drawing, photograph. (F21)

75-F. Many New Rolling Mill Installations Completed in 1953. A. F. Kenyon. *Blast Furnace and Steel Plant,* v. 42, Jan. 1954, p. 83-89.

Includes photographs, diagram, table, oscillograph. (F23, ST)

76-F. Thyratron Control of Air Pistons. Robert L. Alcorn, Jr. *Electrical Manufacturing,* v. 53, Jan. 1954, p. 82-87.

Electronic control of Chambersburg impacter used in drop forging. Diagrams, photograph. (F22)

77-F. Biggest Production Tool. *Fortune,* v. 49, Feb. 1954, p. 123-128.

Air Force's 50,000-ton die-forging press now being installed in Worcester, Mass. Photographs. (F22)

78-F. Mechanized Sheet and Tinplate Mills. John H. Mort. *Iron & Steel,* v. 27, Jan. 1954, p. 3-7.

Equipment, plant layout, and electrical energy consumption. Photographs, table. (To be continued.) (F23, CN)

79-F. Roll Pass Design for Beams. D. A. Winton. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 3-17.

Basic principles and influence of mill design on roll design, roll clearance, and position of the passes. Curves are suggested for calculating numbers and sizes of passes for rolling any size of beam. Diagrams, tables, graphs. (F23)

80-F. Induction Heating in Modern Forging Plants. A. R. Baffrey. *Metal Treatment and Drop Forging,* v. 21, Jan. 1954, p. 35-39.

Some Belgian induction-heating units for this purpose. Graphs, photographs, diagram. (F21, F22)

81-F. Press Forgings—Their Use and Growth. Ernest C. Morse. *Modern Industrial Press,* v. 16, Jan. 1954, p. 42, 44, 46, 48, 50, 52, 54.

Includes photographs, graph. (F22)

82-F. The Rolling of Metals and Alloys. I. Historical Development of the Rolling Mill. Eustace C. Larke. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 61-72.

Drive systems and machines. Photographs, diagrams. 24 ref. (To be continued.) (F23)

83-F. Modern Trends in the Manufacture and Use of Cold Upsetting Tools. II. J. Billigmann. *Draht (English Ed.),* 1953, no. 17, Dec., p. 13-18.

Factors influencing tool life and means of improving it, including design modifications, choice of steels and heat treating processes. Diagrams, tables, graphs. 12 ref. (F22, T5, TS)

84-F. A Complete Plant for the Manufacture of Soldering Wires. Karl Drechsler. *Draht (English Ed.),* 1953, no. 17, Dec., p. 27-29.

Equipment and operating procedures including soldering wire press, coarse multiple drawing machine for soldering wire, multiple soldering wiredrawing machine, and hand polishing machine. Photographs. (F28, SG-f)

85-F. Drawing Power, Rolling Pressure and Rolling Work Measurements by Means of Stress Measuring Strips. K. Fink and W. Lueg. *Draht (English Ed.),* 1953, no. 17, Dec., p. 42-43.

Apparatus and techniques of testing method. Diagrams. (F28)

86-F. Metal Soaps (Stearates) for Wire Drawing. Karl Schimz. *Draht (English Ed.),* 1953, no. 17, Dec., p. 44-45.

Composition, properties, applications, and advantages. (F1, F28)

87-F. (German.) **Development and Status of Dynamo and Transformer Sheet Production.** Hans-Heinz Meyer and Hermann Schlüter. *Stahl und Eisen,* v. 73, no. 26, Dec. 17, 1953, p. 1706-1715; disc., p. 1715-1717.

Production, properties and chemical composition of hot rolled sheet steels and effects of melting methods, rolling conditions, and annealing. Production and properties of cold-rolled strip. Graphs, tables. 89 ref. (F23, D general, J23, ST)

88-F. (Portuguese.) **Giant Rolling Mills Controlled by Electronic Robots Will Produce Plates at 100 Km. Per Hour.** Pierre Devaux. *Engenharia, mineracao e metalurgia,* v. 18, no. 108, Sept.-Oct. 1953, p. 293-294.

The process and its effects on economic equilibrium of Western Europe. Photographs. (F23)

89-F. (Russian.) **Increasing Efficiency of Forge Hammers.** S. S. Lifshits. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 57-58.

Possibility of increasing efficiency from 1.5 to 2 times and of decreasing steam expenditure by 30-50%. Tables, diagrams. (F22)

90-F. (Russian.) **Pipe-Welding Tool for Production of Electric Welded Pipe.** M. E. Katsnel'son. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 78-81.

Manufacture of pipes from hot or cold rolled steel strip. Operation of the welder. Diagram, table, graph. (F26, ST)

91-F. Forging Procedures for Stainless Steels. II. Lester F. Spencer. *Industrial Heating,* v. 21, Jan. 1954, p. 44-46, 204, 206, 208.

Necessary equipment for the forging process. Photographs. 5 ref. (F22, SS)

92-F. Heat Transfer in a Continuous Reheating Furnace. R. J. Sarjant and D. Smith. *Institute of Fuel, Journal,* v. 27, Jan. 1954, p. 16-24.

Systematic experimental investigation into thermal factors of furnace design. Tables, graphs. 17 ref. (F21)

93-F. Application and Use of Self-Centering Rolls. E. T. Lorig. *Iron and Steel Engineer,* v. 31, Jan. 1954, p. 59-72; disc., p. 73.

Many ingenious refinements have been developed in application of self-centering rolls to handling strip. Diagrams. (F23)

94-F. Giant Machine Cold Reduces 18-Inch Tubing. *Machine Design,* v. 26, Jan. 1954, p. 126-129.

Design, construction, and operating characteristics of 100-ft. tube reducer. Diagrams, photographs. (F26)

95-F. Welded Steel Tubing in Heavy Equipment. Rex Cleveland. *Product Engineering,* v. 25, Jan. 1954, p. 186-191.

Design, applications, and manufacturing techniques of equipment made from many shapes of tubing. Diagrams, photograph, table. (F26, G general, T general, CN)

96-F. Rolling Thin Strip in France. American Manufacturer Supplies Mill. *Steel Equipment & Maintenance News,* v. 7, Jan. 1954, p. 16-17.

International engineering is credited with a French steel company's success in producing extremely thin strip for French industry. Photographs. (F23, ST)

97-F. Self Contained Pump Units as Applied to Extrusion Presses. A. J. de Matteo. *Steel Processing,* v. 40, Jan. 1954, p. 15-20.

Equipment, plant layout and operating procedures. Photographs, diagrams. (F24)

98-F. Manufacture and Properties of Large Forgings. Adolph O. Schaefer. *Steel Processing,* v. 40, Jan. 1954, p. 24-32.

Equipment, plant layout and operating procedures. Photographs, tables, diagrams. (F22, AY)

99-F. Integrated Aluminum Window Fabricator Has Complete Extrusion Facilities. *Western Metals,* v. 12, Jan. 1954, p. 52-53.

Equipment and techniques employed. Photographs. (F24, Al)

100-F. New Methods and Instruments for the Inspection of Drawing Dies. W. Lueg. *Wire Industry,* v. 21, Jan. 1954, p. 63, 65, 67. (Translated from *Stahl und Eisen,* v. 71, 1951, p. 157-170.)

Previously abstracted from original. See item 111-F, 1951. (F28)

101-F. (Russian.) **Direct Electric Heating as a Means of Intensifying the Wiredrawing Process.** S. I. Gubkin and V. S. Muras. *Doklady Akademii Nauk SSSR,* v. 91, no. 4, Aug. 1, 1953, p. 803-806.

Operations and advantages of the method. Micrograph, graphs. 3 ref. (F28)

G

Secondary Mechanical Working

61-G. Machinability and Microstructure. Hans J. Heine. *American Foundryman,* v. 25, Jan. 1954, p. 58-61.

Effect of microstructure on machinability, strength and hardness of a material. Micrographs, tables. (G17, M27)

62-G. Caterpillar Hollow - Grinds Clamped Carbide Tips. Matt Aljanich. *American Machinist,* v. 98, Jan. 4, 1954, p. 89-91.

Equipment and techniques employed. Photographs, diagrams, table. (G18)

63-G. Versatile Producer. The Press Brake. II. Piercing and Notching Units Permit Progressive Setups. J. M. Matthewman. *American Machinist,* v. 98, Jan. 4, 1954, p. 96-99.

Equipment and techniques employed. Photographs. (G2)

64-G. Wide-Flanged Shells Draw Easily if You Follow the Rules. Stanley R. Cope. *American Machinist,* v. 98, Jan. 4, 1954, p. 100-103.

Die design and deep drawing operations for production of wide flange shells. Diagrams. (G4)

65-G. High-Speed Trepanning. William M. Stocker, Jr. *American Machinist,* v. 98, Jan. 4, 1954, p. 105-114.

Equipment, techniques and factors to be considered in hole boring. (G17)

66-G. Deep-Hole Boring. H. J. Pearson. *Automobile Engineer,* v. 43, Dec. 1953, p. 563-570.

Development of a new production process for high-speed boring. Current German and Swedish practice. Photographs, diagrams. (G17)

67-G. Using Tungsten Carbide Tools. *Edgar Allen News,* v. 32, Dec. 1953, p. 271-272.

General recommendations for use of tools. Diagrams, tables. (G general)

68-G. The Grinding of Steel. XIII. Grinding Broaches, Scrapers, Chasers and Other Tools. *Edgar Allen News,* v. 32, Dec. 1953, p. 277-278.

Stages in grinding tangential chasers. Table, graph, diagrams. (To be continued.) (G18)

69-G. Proper Tooling Simplifies Machining of Jet Parts. Dennis G. Jones. *Iron Age,* v. 172, Dec. 31, 1953, p. 76-79.

Wide use of high temperature, stainless and titanium alloys for jet engine parts has raised new demands for improved tooling. Photographs, tables. (G17, SS, Ti)

70-G. Deep Drawing Titanium Cups. Carter C. Higgins. *Light Metal Age,* v. 11. Dec. 1953. p. 10-11.

Research into titanium is opening up new possibilities for fabricators. Photographs. (G4, Ti)

71-G. Making Hollow Steel Propeller Blades. *Machinery (London),* v. 83, Dec. 18, 1953, p. 1187-1193.

Machining operations on the root interrelated with matching and balancing of blades. Photographs. (G17)

72-G. Machining Operations on Parts for Small Gas Turbines. *Machinery (London),* v. 83, Dec. 18, 1953, p. 1194-1196.

Boeing Airplane Co. compacts 175-hp. gas turbine and manufacturing techniques. Photographs. (G17)

73-G. The CeDeCut Carbon Dioxide Cooling Technique. *Machinery (London),* v. 83, Dec. 25, 1953, p. 1239-1243, 1285.

Use of liquefied gas as a coolant in metalcutting processes. Photographs. (G21)

74-G. Form-Grinding of Worm Threads. W. A. Tuplin. *Machinery (London),* v. 83, Dec. 25, 1953, p. 1257-1261.

Use of involute helicoid form for worm threads and grinding methods by flat-faced abrasive wheels. Diagrams, photograph. (G18)

75-G. Machining Large Crankshafts. *Mechanical World and Engineering Record,* v. 133, Dec. 1953, p. 544-546.

Equipment, plant layout and operating procedures. Photographs. (G17)

76-G. Production of Gas Turbine Blades. B. P. Dabell and L. H. Williams. *Metal Treatment and Drop Forging,* v. 20, Dec. 1953, p. 571-578.

Various manufacturing techniques and advantages of precision casting and forging of blades. Photographs, tables. (G general, E15, F22)

77-G. Metallurgists Offer Cutting Tools a Bigger Bite. Robert F. Huber. *Steel,* v. 134, Jan. 11, 1954, p. 70-73.

Alloying elements improve machinability of basic steels but leave other physicals unchanged. Photographs, tables. (G17, ST)

78-G. Get the Most Out of Cold Heading. H. C. Weidner, Jr. *Steel,* v. 134, Jan. 11, 1954, p. 74-75.

Operation is generally thought of as being synonymous with fasteners, but equipment, tool and material improvements offer new engineering possibilities. Photographs, diagrams. (G10)

79-G. Magnesium Forming. III. In the Brake and Hydropress. Francis L. Coenen. *Tool Engineer,* v. 32, Jan. 1954, p. 65-72.

Factors which must be given special consideration in working with magnesium, including minimum bend radii, forming temperature and time at temperature. Photographs, graphs, diagrams. (G1, G8, Mg)

80-G. (German.) **Problems of Shaping Sheet Metals.** E. Siebel. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 970-973.

Cupping, deep drawing, expanding, and spinning methods. Diagrams, 7 ref. (G4, G13, G14)

81-G. (Russian.) **Abrasive Processing of Castings.** M. I. Borisov, E. G. Rutter and I. I. Sankov. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 12-15.

Operation of semi-automatic machine. Diagrams, tables. (G18)

82-G. (Russian.) **Machining of Porous Chromium Parts.** N. A. Kamenev, A. A. Mikhailov and M. A. Shluger. *Stanki i Instrument,* v. 24, no. 10, Oct. 1953, p. 28-29.

Methods of maintaining geometrical form and means of preventing closing of pores. Graphs. 3 ref. (G17, Cr)

83-G. Pull-Boring. *Aircraft Production,* v. 16, Jan. 1954, p. 6-8.

Developments in draw-cut machining for second-operation boring. Photographs, diagrams, table. (G17)

84-G. Distribution of Shear-Zone Heat in Metal Cutting. W. C. Leone. *ASME, Transactions,* v. 76, Jan. 1954, p. 121-124; disc., p. 124-125.

Presents an expression for the fraction of thermal energy developed at the shear zone in orthogonal metal cutting which is conducted back into workpiece. Diagrams, graph, tables. 15 ref. (G17)

85-G. Electrodes Displace Twist Drills. H. V. Harding. *Aviation Age,* v. 21, Jan. 1954, p. 98-99.

Holes spaced 0.005 in. apart can be drilled in any metal without distortion of holes or mutilation of web between holes. Photograph. (G17)

86-G. Machining by Electro-Erosion. Leo Walter. *Canadian Metals,* v. 17, Jan. 1954, p. 45-46, 48.

Electro-erosion processes for shaping of metals have been known for some time, but electromechanical repetitive sparking technique has recently progressed considerably. Photographs. (G17)

87-G. A New Plant—Mountaintop, Pa. *Heat Engineering,* v. 28, Oct.-Dec. 1953, p. 97-103.

New, modern plant for fabrication of steam drums and pressure vessels for use in power, petroleum, and process industries. Photographs. (G general)

88-G. Machining the Aviation Gas Turbine High-Temperature Alloys. D. C. Goldberg and H. O. J. Hanzlick. *Machine and Tool Blue Book,* v. 49, Jan. 1954, p. 206-211, 214-218, 220-223.

Metallurgical requirements for compressor, combustion chamber, turbine, and afterburner as well as tooling required to fabricate parts. Tables, photographs. (G17, SG-h)

89-G. Tracer Controls for Machine Tools. George L. Rogers and John L. Dutcher. *Machine Design,* v. 26, Jan. 1954, p. 236, 238, 240-242, 244.

Taken from paper entitled "Practical Considerations in the Use of

Tracer Controls" presented at Sixth Annual AIEE Conference on Machine Tools in Cleveland, O., Oct. 1953. Types of tracer systems and their limitations. (G17)

90-G. Magnetic Tape Programming of Machine Tools. Lawrence R. Peaslee. *Machinery,* v. 60, Jan. 1954, p. 166-172.

How the tape passing through the recorder sets up, or "programs", the signals necessary to control all moving members of a machine tool throughout its operating cycle. Photographs, diagrams. (G17)

91-G. Surface Tempering Caused by Grinding. Gordon Murphy. *Machinery,* v. 60, Jan. 1954, p. 202-203.

Taken from paper presented before Fall Meeting of American Gear Manufacturers Association. Solving surface temper problem ended grinding cracks through elimination of instantaneous heating which was accompanied by rapid expansion and contraction. (G18, ST)

92-G. Developments in Aircraft Production Methods. S. P. Woodley. *Machinery (London),* v. 84, Jan. 8, 1954, p. 88-94.

Based on paper presented at conference of Southern Section of the Institution of Production Engineers, Southampton. Replacement of sheet metal assemblies by single components machined "from the solid" has modified production trends. Photographs, drawings. (G17)

93-G. Production of Large Aircraft Panels From Sheet Material. R. B. Scott and R. L. Vaughan. *Machinery (London),* v. 84, Jan. 15, 1954, p. 121-125.

Fabrication of many airframe parts, simplified by use of an 8000-ton Birdsboro hydraulic triple-action press, which has been installed by the Lockheed Aircraft Corp., Burbank, Calif. Photographs, diagram. (G4)

94-G. Bending Thin-Wall Tubing. F. Pesak. *Machinery (London),* v. 84, Jan. 15, 1954, p. 129-133.

Need for saving weight and space in current and prototype aircraft designs often introduces problems which cannot be solved by established fabricating techniques. Relates to bending of thin-wall tubing for high-pressure ducts of heating and ventilating systems. Diagrams, photographs. (G6, Al)

95-G. Machinability of Heat-Treated Steel. Robert C. Gibbons. *Materials & Methods,* v. 39, Jan. 1954, p. 86-88.

Selection of proper steel, choosing correct heat treatment, and using suitable machining conditions. Photographs, graph. (G17, J general, ST)

96-G. Developing a Test for Broaching Titanium and Its Alloys. R. E. McKee and W. W. Gilbert. *Mechanical Engineering,* v. 76, Jan. 1954, p. 6-12.

Test procedure and criteria for measuring effect of broaching on tool life. Graphs, photographs, tables. 1 ref. (G17, Ti)

97-G. Thread Rolling. *Mechanical World and Engineering Record,* v. 134, Jan. 1954, p. 23.

Characteristics of a method giving a high rate of production with accurate thread form and a stronger metal structure. Diagram. (G12)

98-G. Converting Polishing Lathes to Use Coated Abrasive Belts. J. J. Durnan. *Metal Finishing,* v. 52, Jan. 1954, p. 62-63, 69.

Procedure for conversion which will insure good belt tracking, and a practical range of machine flexibility on existing equipment. Diagrams, photograph. (G19)

99-G. Selecting a Mechanical or Hydraulic Press for Your Particular Job. Len Crary. *Modern Industrial Press,* v. 16, Jan. 1954, p. 56, 58, 60, 62-63.

Twin-drive, toggle presses, drawing speeds, and redrawing operations. Examples of hemispherical and conical shells. Tables, diagrams. (G1)

100-G. Increased Productivity With Carbides. I. Selection and Application. Guy Monacelli. *Screw Machine Engineering,* v. 15, Jan. 1954, p. 33-37.

Factors to be considered in machining metals and nonmetals. Photographs, tables, diagrams. (G17)

101-G. Bar Stock and Stocking Efficiency. *Screw Machine Engineering,* v. 15, Jan. 1954, p. 51-53.

Minute savings in machine time, stock, and downtime represent staggering savings when the run is exceptionally long. Table, diagrams, photographs. (G17)

102-G. Data Sheet 3-A. Speeds and Feeds for Aluminum. *Screw Machine Engineering,* v. 15, Jan. 1954, p. 55-58.

Forming, necking, facing, skiving, turning, box milling, and cutting-off. Tables. (G17, Al)

103-G. The Forming of Aluminium Sheet. III. Spinning. H. Hinxman. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 41-45, 50.

Properties and technique. Photographs. (To be continued.) (G13, Al)

104-G. Research Views Machinability. How to Determine Machinability. Francis W. Boulger. *Steel,* v. 134, Jan. 18, 1954, p. 88-90.

Inherent ability of workpiece material to aid cutting tool is part of rapid machining picture. Effect of environmental factors. Graphs, tables, photograph, diagram. (G17)

105-G. Steel Cartridge Cases. Their Cold Forming and Heat Treating. S. S. Rice. *Tooling and Production,* v. 19, Dec. 1953, p. 52-58.

Includes photographs, diagrams, micrographs. (G4, J general, CN)

106-G. Machines. *Draht (English Ed.),* 1953, no. 17, Dec., p. 33-35.

Automatic wire winding machine, high production machine for manufacture of link and roller-chain brushes and rollers, and automatic nut milling machine. Photographs, table. (G general)

107-G. A New Process for the Manufacture of Cold Formed Hexagon Nuts. F. Lie Kmeier. *Draht (English Ed.),* 1953, no. 17, Dec., p. 43-44.

Equipment and operating techniques. Photographs. (G10)

108-G. (Russian.) **Analysis of Factors Affecting Contact Area of a Shaving With the Face of the Tool and Average Normal Specific Pressure.** A. M. Zhukov. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 52-56.

Change of tool strength under various cutting conditions. Macrographs, graphs, tables. 4 ref. (G17)

109-G. Belt Finishing of Carbide Tools Proves Effective. F. J. Lennon, Jr. *American Machinist,* v. 98, Feb. 1, 1954. p. 104-107.

Special abrasive-belt grinders are a suitable alternate to diamond wheels in times of emergency. Photomicrographs, photographs, diagram. (G18)

110-G. The Grinding of Steel. XIII. Grinding Broaches, Scrapers, Chasers, and Other Tools. XIV. Grinding Steel Castings. *Edgar Allen News,* v. 33, Jan. 1954, p. 11-12.

Grinding taps, wheel speeds and type, machine maintenance and precautions in grinding. Photograph, tables. (To be continued.) (G18, ST)

111-G. Vibrator Control of Tracer Drive. S. H. Rover. *Electrical Manufacturing,* v. 53, Feb. 1954, p. 101-105.

Low-contact pressures between stylus and template is achieved with new automatic tracer for flame-cutting machines. Photographs, diagrams. (G22)

112-G. How Does Titanium Machine? I. O. W. Boston. *Iron Age,* v. 173, Jan. 21, 1954, p. 100-103; Jan. 28, 1954, p. 120-122.

Research on chip formation, work hardening, surface finish, tolerances, cutting temperatures and nature of tool wear. Photograph, micrographs, graphs, table. (G17, Ti)

113-G. Machining Innovations Expedite Work on Zinc Die Castings. Herbert Chase. *Machine and Tool Blue Book,* v. 49, Feb. 1954, p. 197-198, 200-201.

Broaching slot in window regulator handle hub proves faster than side coring. Diagram, photographs. (G17, Zn)

114-G. Improved Honing. *Machinery Lloyd (Overseas Ed.),* v. 26, Jan. 16, 1954, p. 95-96.

Machine and operating characteristics. Diagram. (G19)

115-G. Spinning Non-Circular Components for Aircraft. J. S. Walker. *Machinery (London),* v. 84, Jan. 22, 1954, p. 186-188.

Equipment, techniques and applications. Photographs, diagram. (G13)

116-G. How to Machine Aluminum and Magnesium. Guy Monacelli. *Modern Metals,* v. 9, Jan. 1954, p. 33-34, 36, 38.

Achievement of best results when machining aluminum and magnesium with tools made of "Carboloy" cemented carbides. Tables, photographs. (G17, Al, Mg)

117-G. Magnesium Forming. IV. Deep Drawing and Miscellaneous Methods. Francis L. Coenen. *Tool Engineer,* v. 32, Feb. 1954, p. 68-71.

Effects of temperature, rate of loading and lubrication. Diagram, graph, photographs. (G4, Mg)

118-G. Stretch Forming. A Specialty. *Western Machinery and Steel World,* v. 45, Jan. 1954, p. 99-101.

Discussion of underlying principles. Photographs. (G9, Al)

119-G. (Photocopy.) **The Grinding of Titanium Alloys. P. B. 112049. MIT for U. S. Army Ordnance Corps.** 76 p. 1953. Available from Library of Congress, Washington 25, D. C. Microfilm $3.50. Photostat $10.00.

Grinding characteristics of four representative titanium alloys are reported in this study. Rate of wheel wear, surface finish, energy consumed, and metallurgical damage are recorded for a wide range of variables. (G19, Ti)

120-G. (Book.) **Fabricated Materials and Parts.** T. C. Du Mond. 332 p. Chapman and Hall Ltd., 37, Essex St., London W.C. 2, England. 52s.

Survey of methods of manufacture available to designer. (G general)

121-G. (Book.) **Machine Shop Tooling Data for Machine Tool Operators and Machinists.** Charles C. Williams. 342 p. 1953. Wilco Press, 3326 N. Bailey St., Philadelphia 29, Penna.

Designed for the man at the machine and alphabetized like a dictionary for quick reference. Specific recommendations for drills, taps, milling cutters, grinding wheels, threaders, turning tools, special threads, etc., for all materials aluminum to zinc. Reference section on causes of most machine tool and material troubles and what to do about them. (G17)

H

Powder Metallurgy

20-H. Powder Metal Applications. *Metal Industry,* v. 83, Dec. 25, 1953, p. 517-520.
Includes photographs, diagrams. (H general, T general, AY, Cu)

21-H. Dependable, Low Cost Powdered Metal Supply. Julius Sachse. *Precision Metal Molding,* v. 12, Jan. 1954, p. 37, 83-87.
Reviews uses of metal powders other than pressing and sintering of parts and bearings. Photographs. (H general)

22-H. Sintered Manganese Steels. F. Benesovsky and R. Kieffer. Henry Brutcher, Altadena, Cal., Translation no. 2974, 15 p. + 1 plate. (From *Berg- und huttenmännische Monatshefte,* v. 95, no. 8, 1950, p. 145-150.)
Manganese steels of known composition, containing 2-16% manganese and 0.2-1.6% carbon, can be technically produced without difficulties by sintering method. Graphs, micrographs. 22 ref. (H15, AY)

23-H. Sintering of Tungsten Carbide-Cobalt Compositions as Surface Reaction. W. Dawihl. Henry Brutcher, Altadena, Cal., Translation no. 3067, 11 p. (From *Zeitschrift für Metallkunde,* v. 43, no. 1, 1952, p. 20-22.)
Previously abstracted from original. See item 42-H, 1952. (H15, Co, W, C-n)

24-H. The Theory of Sintering. G. A. Geach. Paper from "Progress in Metal Physics". Interscience Publishers, Inc., p. 174-204 + 1 plate.
Includes graphs, tables, diagram. 80 ref. (H15)

25-H. (German.) The Description and Evaluation of Different Types of Zinc Powders. H. Enzfelder. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 98, no. 11, Nov. 1953, p. 234-236.
Classification of zinc powders according to source or grain size. Hydrogen evolution and its effectiveness in precipitating metallic impurities from zinc solutions. Micrographs, tables, graphs. 4 ref. (H11, Zn)

26-H. (German.) Sintered Nickel-Copper Alloys. (Monel). F. Benesovsky. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 894-895.
Literature review. Problem of producing finished parts by powder metallurgy. Tables, micrographs. 6 ref. (H15, Ni, Cu)

27-H. (German.) Heat Resisting Materials and Cermets. Bruno Waeser. *Werkstoffe und Korrosion,* v. 4, no. 11, Nov. 1953, p. 397-399.
Literature review. Combination of properties that afford protection up to 1000° C. Tables, graphs. 28 ref. (H general, AY, Cr, Ni, Fe, Co)

28-H. (Polish.) Fundamentals of Handling Technological Documentation Illustrated by the Case of Powder Metallurgy. Edmund Bryjak. *Hutnik,* v. 20, no. 12, Dec. 1953, p. 367-374.
Symbolization in production departments, systematization of documents, technological short-cuts, work regulation and machines. Tables. 3 ref. (H general)

29-H. Precision Parts Sintered in Gas-Fired Furnace. Robert O. Borden. *Industrial Gas,* v. 32, Jan. 1954, p. 3-5.
Meter operation is improved and maintenance minimized. Production is increased and cost of parts considerably reduced. Diagrams, photographs, table. (H15)

30-H. Analysis of the Area Determinations of Copper Powders. B. D. Cuming and J. H. Schulman. Paper from "Recent Developments in Mineral Dressing, Symposium." p. 5-9; disc., p. 85-97. Sept. 1952. Institute of Mining and Metallurgy, London, England.
Adsorption isotherms were carried out on heated and unheated copper surfaces from gaseous, petroleum ether, and aqueous environment. Results are compared to geometrical and air-permeability 'areas.' Graphs, table. 5 ref. (H12, B14, Cu)

31-H. Metal Powders Ease Production Headaches. Allen G. Gray. *Steel,* v. 134, Jan. 25, 1954, p. 88-91.
Growing list of cost-saving applications being made in industry. Photographs. (H general)

32-H. (Polish.) Atomization of Low Melting Metal Powders. W. Rutkowski and W. Cegielski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 5, no. 5, Sept.-Oct. 1953, p. 291-297.
Apparatus for atomization of molten tin, lead, and zinc. Operating conditions of atomization. Various properties of the powders. Micrographs, tables, diagrams. 5 ref. (H10, H11, Sn, Pb, Zn)

33-H. (Russian.) Properties of Iron Powder Obtained by Pulverization. V. I. Prosvirin and A. F. Silaev. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 59-61.
Powders obtained by compressed air pulverization have better properties than those obtained by centrifugal pulverization. Graphs, table, micrographs. (H10, H11, Fe)

34-H. Piston Rings of Iron Powder. Alfred Hermanns. *Precision Metal Molding,* v. 12, Feb. 1954, p. 35-37, 78-81.
Economical and metallurgical advantages of this method. Microphotographs, graph. (H general, Fe)

35-H. Compacting and Sintering of Metal Powders Studied on Basis of Their Electrical Conductivity. V. I. Likhtman and L. T. Nazarov. Henry Brutcher, Altadena, Cal., Translation no. 3065, 13 p. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 22, no. 4, 1952, p. 696-702.)
Discusses electrical conductivity of metal-powder compacts as consistent function of size, character, and number of areas of contact. Experimental set-up and procedure. Tables, graphs. 5 ref. (H11, Fe, Cu)

36-N. Crystallization of Liquid Phase. I. N. Bogachev. Henry Brutcher, Altadena, Cal., Translation no. 3081, 21 p. (Part translation from book by I. N. Bogachev and A. A. Popov, entitled *"Phase Transformations in Iron-Carbon Alloys",* Mashgiz, 1950, p. 4-17.)
Book abstracted from the original as item 114-N, 1953. (N12, Fe)

37-H. Crystal-Lattice Distortions and Sintering of Metal Powders. L. I. Gal'perina, Ya. E. Geguzin, N. Ya. Pines and I. V. Smushkov. Henry Brutcher, Altadena, Cal., Translation no. 3088, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 88, no. 2, 1953, p. 265-268.)
Processes of stress relief and elimination of crystal-lattice distortions in metal-powder compacts studied by X-ray diffraction and by heat capacity measurements. Table, graphs. 7 ref. (H11, H15, Cu, Ni, Fe)

J

Heat Treatment

59-J. Carbo-Nitriding. *Automobile Engineer,* v. 43, Dec. 1953, p. 550-552.
A new Birlec controlled-atmosphere furnace for light-case work. Photographs, diagrams. (J28)

60-J. Elevator Furnaces at Gloucester Foundry for Blackheart Malleable. P. F. Hancock. *Foundry Trade Journal,* v. 95, Dec. 10, 1953, p. 733-736.
Equipment, plant layout and operating procedures. Photographs, diagrams, graph, table, micrographs. 4 ref. (J23)

61-J. Induction Heating: Low Frequencies Have Advantages. J. A. Logan. *Iron Age,* v. 172, Dec. 24, 1953, p. 69-72.
Induction heating can be used in applications previously considered impractical because of the cost of high-frequency motor generator sets. Photographs. (J2)

62-J. Hot Oil Quenching Toughens Tractor Shovel Parts. R. H. Marshall. *Iron Age,* v. 172, Dec. 31, 1953, p. 67-71.
Improve service life of gears by quenching in hot oil. Photographs, diagram. (J26)

63-J. Heat Treatment and Assembly Operations in Tractor Gearbox Production. *Machinery (London),* v. 83, Dec. 18, 1953, p. 1197-1199.
Includes photographs. (J general)

64-J. Investigations on Annealing of Steels From Hot-Working Temperature With Isothermal Transformation. E. Theis. Henry Brutcher, Altadena, Cal., Translation no. 3032, 13 p.; disc., p. 13-17 + 3 plates. (Condensed from *Stahl und Eisen,* v. 71 no. 26, 1951, p. 1433-1438; disc., p. 1438-1440.)
Previously abstracted from original. See item 64-J, 1952. (J23, N8, ST)

65-J. Annealing and Tempering of Steel Bars in an Induction Heat Treating Plant on Line Frequency. H. Krainer, M. Kroneis, and F. Raidl. Henry Brutcher, Altadena, Cal., Translation no. 3038, 13 p. + 2 plates. (From *Stahl und Eisen,* v. 71, no. 17, 1951, p. 880-886.)
Previously abstracted from original. See item 290-J, 1951. (J2, Q general, ST)

66-J. Nitriding of Austenitic Steels. K. S. Khomenko. Henry Brutcher, Altadena, Cal., Translation no. 3047, 7 p. (From *Vestnik Mashinostroeniya,* v. 32, no. 3, 1952, p. 71-72.)
Difficulties encountered in nitriding of austenitic steels and ways in which they may be overcome. (J28, ST)

67-J. On the Hardening of Steel, With Special Reference to Transformation Kinetics. F. Wever. Henry Brutcher, Altadena, Cal., Translation no. 3059, 19 p. + 1 plate. (Condensed from *Stahl und Eisen,* v. 69, no. 19, 1949, p. 664-670.)
Previously abstracted from original. See item 18B-203, 1949. (J26, N8, ST)

68-J. Investigations Into the Spheroidizing of Plain Carbon and Low Alloy Steels. S. Ammareller. Henry Brutcher, Altadena, Cal., Translation no. 3083, 20 p. + 1 plate. (From *Stahl und Eisen,* v. 70, no. 11, 1950, p. 459-463.)
Previously abstracted from original. See item 164-J, 1950. (J23, N8, CN, TS)

69-J. (Dutch.) Heating With High-Frequency Energy. A. de Vries. *Bedrijf en Technick,* v. 8, no. 189 (24); Electronica section, v. 6, no. 136, Nov. 21, 1953, p. 185-187.
Heating metals by high-frequency induction method. Diagrams. (J2)

70-J. (Dutch.) Hardenability of Steel. F. Van Wijk. *Metalen,* v. 8, no. 22, Nov. 30, 1953, p. 401-406.
A concise survey presented on theory of depth of hardening of steel. Hardenability, severity of quench and dimensions of quenched piece as factors controlling depth

of hardening. Graphs, tables, photograph. 6 ref. (J26, ST)

71-J. (German.) **Machines for the Induction Hardening of Surfaces.** E. Höhne. *Elektrotechnische Zeitschrift,* v. 5, Ausgabe B, no. 11, Nov. 21, 1953, p. 359-363.
Principle of process and machines operated with average and high-frequency current. Graph, photographs, diagram. 4 ref. (J2)

72-J. (Norwegian.) **Surface Hardening of Steel.** Sigge Hähnel. *Teknisk Ukebald,* v. 100, no. 45, Dec. 3, 1953, p. 970-975.
Survey surface hardening methods. (J28, ST)

73-J. (English.) **The Annealing of Copper After Radiation Damage at Low Temperatures.** R. R. Eggleston. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 679-683.
Up to 80° C., rate of annealing was similar, but at room temperature about 25% of the radiation damage remained, compared to 50% remaining in the cold worked specimen. Graphs, table, diagram. 8 ref. (J23, Cu)

74-J. Nitriding Produces Better Hard Case on Titanium. J. L. Wyatt and N. J. Grant. *Iron Age,* v. 173, Jan. 14, 1954, p. 112-115.
Nitride hardening with ammonia will improve wear and antigalling properties. Graphs, micrographs, table. (J28, Ti)

75-J. The Design and Construction of Inductors. D. Warburton-Brown. *Mechanical World and Engineering Record,* v. 134, Jan. 1954, p. 11-19.
Practical design of coils to suit a variety of workpieces. Some useful notes on making coils. Diagrams, photographs, graph. (J2)

76-J. Bright Annealing Copper Strip. *Metal Industry,* v. 84, Jan. 8, 1954, p. 32.
Equipment and processes. Photographs. (J23, Cu)

77-J. Heat-Treatment of High-Speed Steel. I. Introduction and General Outline of Techniques. S. G. Cope. *Metal Treatment and Drop Forging,* v. 21, Jan. 1954, p. 3-10.
Development of high speed steels. Standard hardening treatments. Some factors influencing final microstructure and properties of the steel. Graphs, photomicrographs. 10 ref. (J26, M27, TS)

78-J. (Russian.) **Carburizing of Steel by Natural Gas.** G. I. Pogodin-Alekseev and G. V. Zemskov. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 65-68.
Composition of the gas and carburizing temperature. Graphs. 3 ref. (J28, ST)

79-J. (Russian.) **Influence of Chromium and Manganese Concentration in the Metallic Phase on the Annealing Ability of Toolsteel.** V. V. Polovnikov. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 68-70.
Specimens of 24 melts were tested. Table, graphs. (J23, TS)

80-J. (Russian.) **Means of Obtaining Deep Low-Temperature Gas Cyanidation.** E. N. Druzhinina. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 70-73.
Confirms positive influence of preliminary electrochemical cleaning of parts and of aluminum chip introduced into the muffle furnace at 550 to 600° C. Tables, micrographs. 6 ref. (J28, L13, TS)

81-J. Effect of Prebaking in Malleablizing Iron. Floyd Brown. *American Foundryman,* v. 25, Feb. 1954, p. 50-51.
Prebaking hard iron forms graphite nuclei. This does not require hydrogen which, in fact, inhibits the prebaking effect. Graph, table. 6 ref. (J23, CI)

82-J. High-Temperature High-Vacuum Furnace. H. W. Davidson and T. H. Burwood. *Engineering,* v. 177, Jan. 22, 1954, p. 106-108.
Simple design for heat treatment up to 2200° C. Photographs, graph, diagrams. 6 ref. (J2)

83-J. Continuous Heat Treatment of Non-Ferrous Strip by Transverse Flux Induction Heating. II. Robert M. Baker. *Industrial Heating,* v. 21, Jan. 1954, p. 56, 58, 60, 62, 66, 68, 146.
Design and operating experience with transverse flux coils. Photographs. (J2)

84-J. Nitriding Improves Titanium Properties. II. J. L. Wyatt and N. J. Grant. *Iron Age,* v. 173, Jan. 28, 1954, p. 124-127.
Increased hardness, resistance to galling, improved creep rupture properties and better oxidation resistance. Graphs, tables. (J28, Q29, Q3, Q9, R2, Ti)

85-J. Machined Parts and Their Dimensional Control in Heat Treatment. II. Howard Boyer. *Modern Machine Shop,* v. 26, Feb. 1954, p. 132-143.
Dimensional changes produced in machined parts during heat treatment. Graph, photograph, drawings, table. (J general, P10, ST)

86-J. Heat Treatment of Aircraft Parts. Frank Crahen. *Steel Processing,* v. 40, Jan. 1954, p. 48-49, 58.
Equipment and processes for carburizing, hardening and annealing steel parts. Photograph, table. (J28, J27, J23, AY)

87-J. Production Changes at Riverbank. *Western Machinery and Steel World,* v. 45, Jan. 1954, p. 92-94.
Equipment, plant layout and operating procedures for large western spheroidizing plant. Photographs. (J23, CN)

88-J. (English.) **Thermal Annealing of Radiation-Induced Hardness Changes in Alkali Halides.** D. R. Westervelt. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 755-758.
Hardness changes, occurring under conditions where a large number of displacements may be expected, differ markedly in their thermal annealing characteristics from those where damage is largely due to ionization. Graphs. 5 ref. (J23, Q29)

89-J. (French.) **Electric Furnaces With a Controlled Atmosphere.** Marcel Chain. *Journal du Four Electrique,* v. 62, no. 6, Nov.-Dec. 1953, p. 169-175; disc., p. 175-176.
Atmospheres and equipment. Graphs, diagrams, photographs. (J2)

90-J. (Photocopy.) **Development of Titanium-Base Alloys.** P. B. 112227. Wright Air Development Center, U. S. Air Force. 158 p. 1952. Available from Library of Congress, Washington 25, D. C. Microfilm $6.00. Photostat $20.00.
Experiments indicate that it may be commercially possible to solution-treat certain alloys at about 1300° F., machine or form a part, and then age-harden the part to a high strength. These alloys may be stable for extended periods of time at operating temperatures of up to 600° F., thus opening up a whole new field of application for high-strength alloys of titanium. (J27, Ti)

K
Joining

106-K. Spot Welding Aluminum. I.-III. *American Machinist,* v. 98, Jan. 4, 1954, p. 123, 125, 127.
Three data sheets. (K3, Al)

107-K. Welding Problems in the Construction of a Modern Boiler Plant. F. L. Dingle. *Australasian Engineer,* 1953, Nov., p. 46-51.
Paper from Welding Engineering Symposium, Sydney, Nov. 1953. High pressure and temperature considerations in steam generator construction. Photographs, diagrams. (K general)

108-K. Automatic Welding Lines for Fisher Body Components. Thomas MacNew. *Automotive Industries,* v. 110, Jan. 1, 1954, p. 56-59.
Progress made by one of today's largest users of welding automation. Photographs, diagram. (K general)

109-K. Inert Gas Welding Applied to Pipe and Tubing. R. E. Lorentz, Jr. *Combustion,* v. 25, Dec. 1953, p. 41-45.
General information concerning one of the newer welding processes as used in the welding of pipe and tubing. Inert-gas welding processes are widely used in many more applications than those discussed. Photographs. (K1, CN, SS)

110-K. Modern Welding Technique. XX. Miscellaneous Non-Ferrous Alloys. XXI. The Metallurgy of Steel Welding. E. T. Gill and Eric N. Simons. *Edgar Allen News,* v. 32, Dec. 1953, p. 273-274.
Preparation of surfaces, techniques of resistance welding and repair of castings for magnesium and its alloys. General remarks regarding welding of steel. (To be continued.) (K general, ST, Mg)

111-K. Plate-Girder Bridges. G. Roberts and O. A. Kerensky. *Engineer,* v. 196, Dec. 11, 1953, p. 786-788.
Indicates lines that a design should follow to achieve real economy in welded structures. Graph, table, diagrams. (K general, T26, ST)

112-K. Weld Aluminum Die Castings With Inert Arc Process. Robert Haslip. *Industry & Welding,* v. 27, Jan. 1954, p. 33-36.
Selection of proper welding process and development of correct welding techniques. Photographs. (K1, Al)

113-K. A Guide to Pipe Welding Layout. II. Dorsey B. Thomas. *Industry & Welding,* v. 27, Jan. 1954, p. 38-40, 42.
Methods accumulated after years of experience. Diagrams. 1 ref. (K general)

114-K. Use All-Welded Trusses for Freedom in Plant Design. *Industry & Welding,* v. 27, Jan. 1954, p. 45-47, 64.
Reduced weight and increased rigidity of H-type trusses. Photographs. (K general, T26)

115-K. How to Use Hot Pressure Welding. *Industry & Welding,* v. 27, Jan. 1954, p. 50-52, 55-57.
Includes photographs. (K2)

116-K. Weld Cast Iron With Minimum Heat. *Industry & Welding,* v. 27, Jan. 1954, p. 58, 60.
Glass container molds that develop flaws during manufacture can be easily repaired without preheating the entire mold. Photograph, diagram. (K general, CI)

117-K. How to Align Shafts for Welding. *Industry & Welding,* v. 27, Jan. 1954, p. 62, 64.
Set-up used in welding an extension to a conveyer roller shaft. Diagram. (K general)

118-K. Transformer Induction Fixtures Speed Brazing. *Metal-Working,* v. 10, Jan. 1954, p. 6-7.
Two-sided coil brazes joint without distorting pulley web. Photographs, diagram. (K8)

119-K. Scientific and Practical Welding Repairs. C. W. Brett. *Overseas Engineer,* v. 27, Jan. 1954, p. 216-217.
Modern principles and methods. Photographs. (K general)

120-K. Poor Welds Can Start Brittle Fracture. F. J. Feely and M. S. Northup. *Steel,* v. 134, Jan. 11, 1954, p. 100-101.

Welding defects and improper repairs led to complete failure of two storage tanks in English refinery. Photographs, diagram. (K general, Q26)

121-K. Cascade System for Argon Gas. William P. Brotherton. *Western Machinery and Steel World,* v. 44, Dec. 1953, p. 92-93.

Changing from individual tanks to a central system resulted in considerable saving in welding time and bottle handling. Photographs. (K1)

122-K. Waxless Thermit Welding Needs no Preheat. *Welding Engineer,* v. 39, Jan. 1954, p. 26-27.

Welding operations in construction of the Tappan Zee bridge. (K4, T26)

123-K. Refrigerator Plant of Tomorrow. Clyde B. Clason. *Welding Engineer,* v. 39, Jan. 1954, p. 28-31.

New ideas, layout, techniques, skills and many new production welding tools. Photographs. (K general, T27, Al, ST, Cu, SS)

124-K. Big Job for Welded Steel. Van Rensselaer P. Saxe. *Welding Engineer,* v. 39, Jan. 1954, p. 34-35.

Use of welded connections and continuity design which saved 135 tons of steel in construction of new 14-story Broadview Apartments. Photographs, diagrams. (K general, T26, ST)

125-K. How to Build a Fixture. Roger Isetts. *Welding Engineer,* v. 39, Jan. 1954, p. 38-39.

Provision for access to the work, selection of clamps, location of work and spatter prevention. Diagrams, photographs. (K general)

126-K. Mig Welding on Minesweepers. John Gowan. *Welding Engineer,* v. 39, Jan. 1954, p. 40-42, 46.

Metal inert gas welding operations on aluminum-bronze rudders and aluminum cable reels. (K1, Al, Cu)

127-K. Flux Backings in the Submerged Arc Welding of Vessels. I. N. Gerasimenko. Henry Brutcher, Altadena, Cal., Translation no. 2999, 3 p. + 1 plate. (From *Avtogennoe Delo,* v. 20, no. 5, 1949, p. 16-17.)

Previously abstracted from original. See item 22B-392, 1949. (K1)

128-K. (French and German.) **Radiant Heating.** H. Weilmann. *Zeitschrift für Schweisstechnik,* v. 43, no. 12, Dec. 1953, p. 233-236.

Principles of radiant heating. Installation and welding of pipes for radiant-heating systems. Photographs. (To be continued.) (K general, T27, ST)

129-K. (French.) **Techniques of Repairing Hydraulic Turbines by Welding and Associated Processes at the Electricité de France.** J. Narcy and R. Kermabon. *Soudure et Techniques connexes,* v. 7, nos. 11-12, Nov.-Dec. 1953, p. 265-278; disc., p. 278-281.

Repairing techniques depending on type of wheel, wear characteristics and chemical composition of metal. Operating methods and chemical composition of electrodes used. Photographs, tables. (K1, CN, SS, Cu)

130-K. (French.) **Rate of Fusion of Arc-Welding Electrodes.** J. ter Berg and A. Larigaldie. *Soudure et Techniques connexes,* v. 7, nos. 11-12, Nov.-Dec. 1953, p. 285-290; disc., p. 290.

Various factors influencing specific rate of fusion of electrodes by arc welding. Chemical composition of coatings. Graphs, diagrams, table, photographs. 7 ref. (K1)

131-K. (German.) **Calculation of Welded Design for Static Load.** K. H. Effertz. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 394-400.

Mathematics for welded parts subjected to various types of static stresses. Graph, table, diagrams. 8 ref. (K general, Q25)

132-K. (German.) **Calculation of Welded Joints for Variable Stress.** A. Erker. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 400-417.

Change of stress with time, notch effects, calculation of fatigue strength, effect of irregular stresses, permissible stress and safety factors, butt, spot, seam, and fusion welding, strap joints and details of weld design. Tables, diagrams, graphs, photographs. 54 ref. (K general, Q25)

133-K. (German.) **Mutual Effect Between Welding Process and Weld.** Walter Schulze. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 417-423.

Principles of different welding methods and various types of joints and seams. Tables, graphs, diagrams. (K general)

134-K. (German.) **Welded Corner Joints in Machine-Construction.** Walter Schulze. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 424-427.

Type and magnitude of stress, welding method and economic factors must be considered in design of welded corner joints. Diagrams, graphs. (K general, Q25)

135-K. (German.) **Welded Flanges, Reinforcements, and Nozzles.** E. Wiese. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 427-429.

Different methods of attaching nipples and other structural parts to heavy steel plate. Diagrams. (K general, ST)

136-K. (German.) **Pipe Joints in Structural Steelwork.** H. Böhden and A. Köhler. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 429-432.

Different methods of joining pipe of different and equal diameters. Diagrams. 2 ref. (K general, ST)

137-K. (German.) **Welded Pipe-Joints.** H. Jansen. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 432-435.

Design of different joints. Photographs, diagrams, graph. 4 ref. (K general)

138-K. (German.) **Design of Hinged Connections for Structural Members.** H. Heitzer. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 436-440.

Numerous designs of mono and multilateral hinge fittings. Diagrams. (K general)

139-K. (German.) **Welded Corners of Frames.** H. Schulz and K. H. Kenn. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 441-445.

Numerous intricate designs. Diagrams. (K general)

140-K. (German.) **Joints at Right Angles in Welded Constructions.** H. Kriesche. *Schweissen und Schneiden,* v. 5, no. 11, Nov. 1953, p. 445-455.

Numerous methods of joining sheet metal and structural steel at 90° angles. (K general)

141-K. (Hungarian.) **Brazing of Metals. I.** Istvan Varga. *Aluminium (Budapest),* v. 5, no. 10, Oct. 1953, p. 222-224.

Advantages, general principles, and various processes. Diagrams, photographs, table. (To be continued.) (K8)

142-K. (Hungarian.) **Brazing of Metals. III.** Istvan Varga. *Aluminium (Budapest),* v. 5, no. 12, Dec. 1953, p. 251-258.

Properties of various brazing metals. Adaptability of these metals to joining various materials. Correct design of joints. Tables, diagrams, graphs. 14 ref. (K8)

143-K. Welding in the Fabrication, Construction, and Erection of Power Station Steelwork. *Australasian Engineer,* 1953, Dec., p. 45-47, 72.

Paper no. 3 delivered before the Welding Engineering Symposium, Sydney, on Nov. 12, 1953. Design, fabrication, and weld construction. (K general, T26)

144-K. Cracking in Stainless and Heat-Resisting Weld Metals. H. F. Tremlett. *Institute of Welding, Transactions,* v. 16, Dec. 1953, p. 143-150; disc., p. 150-153, 174.

Develops idea that cracking in stainless and heat resisting welds may be prevented by proper choice of weld structure. Photographs, graphs, tables. (K9, SG-g, h)

145-K. Weldability of High Tensile Structural Steels. L. Reeve. *Institute of Welding, Transactions,* v. 16, Dec. 1953, p. 154-162; disc., p. 163-166.

Development of weldable high-tensile structural steels, including the standard steel and some details of higher yield point steels now commercially available. Graphs, tables, diagrams, photomicrographs. 12 ref. (K9, AY)

146-K. Induction Heater Boosts Output of Brazed and Soldered Parts. O. W. Noeske and W. F. Sickels. *Iron Age,* v. 173, Jan. 14, 1954, p. 116-117.

Induction heating for soft soldering and silver brazing five joints of a thermostatic diaphragm has cut costs, increased production, and reduced rejects. Diagram, photograph. (K7, K8)

147-K. Tooling and Welding Aft Frames at Ryan Aeronautical. *Machine and Tool Blue Book,* v. 49, Jan. 1954, p. 226-231.

Includes photographs. (K general, G general)

148-K. Shrink Fits. J. H. Faupel. *Machine Design,* v. 26, Jan. 1954, p. 114-124.

How increased efficiency of structural and machine parts can be more economically obtained by using materials in their optimum stressed conditions. Diagrams, graphs, tables. 6 ref. (K13, Q general)

149-K. Designing Ring Sections. Verne Wildman. *Machine Design,* v. 26, Jan. 1954, p. 149-152.

Use of flash welded rolled sections offers considerable savings in materials and production time. Photographs, diagrams, table. (K3)

150-K. Close Tolerance Aluminum Parts Brazed in Salt Bath. William J. Rudolph. *Materials & Methods,* v. 39, Jan. 1954, p. 96-99.

When properly done, dip brazing lowers unit cost, reduces scrap, and produces joints as strong as those by other methods. Photographs, diagram, table. (K8, Al)

151-K. The Determination of Droplet Size in Arc Welding by High-Speed Cinematography. P. D. van der Willigen and L. F. Defize. *Philips Technical Review,* v. 15, Oct. 1953, p. 122-128.

Films have been made of transfer of weld metal, with a camera taking up to 3000 frames per sec. Graph, diagrams, photographs, tables. (K1, CN)

152-K. 23 Ways to Attach Small Die Cast Parts. Hiram K. Barton. *Product Engineering,* v. 25, Jan. 1954, p. 198-202.

Diagrams and explanations. (K general, E13)

153-K. Spot Welding of Ferritic Chrome Steels. Hans Wängsjö. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 31-39.

Welding difficulties of this nickel-steel substitute. Photomicrographs, graphs, tables. (K3, SS)

154-K. Cold Pressure Welding of Titanium. J. E. Hughes. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 52-54, 60.

Cold welding as a possible industrial method for the fabrication of titanium components. Photograph, tables. 3 ref. (K5, Ti)

155-K. Stud Welding: Fastening Costs Down 30 Per Cent. *Steel,* v. 134, Jan. 18, 1954, p. 91.

Semi-automatic equipment which interjects mass production technique. Photographs. (K1)

156-K. Welding in the Atomic Energy Projects. I. H. Hogg. *Welding and Metal Fabrication,* v. 22, Jan. 1954, p. 2-14.

A complete discussion of welding processes used at a plant in Canada. Photographs, tables, diagrams. (K general, T25)

157-K. Structures for Atomic Defence. *Welding and Metal Fabrication,* v. 22, Jan. 1954, p. 22-27.

Welding used in construction of equipment for atomic apparatus. Photographs. (K general)

158-K. Aspects of Welding Research in British Merchant Shipbuilding. R. B. Shepheard. *Welding and Metal Fabrication,* v. 22, Jan. 1954, p. 28-32.

Welding research affecting shipbuilding undertaken in Great Britain during recent years. Diagrams, photographs. 19 ref. (K9, T22)

159-K. Inert-Arc Field Welding of Pressure Piping. R. T. Pursell. *Welding Journal,* v. 33, Jan. 1954, p. 41-46.

Use of paper disks as backing strips. Photographs, micrographs, diagrams, table. (K1, ST)

160-K. Optimum Spot and Seam Welding Conditions for Inconel "X". Ernest F. Nippes and Herbert B. Fishman. *Welding Journal,* v. 33, Jan. 1954, p. 1S-14S.

Determination of optimum conditions on basis of tension-shear, cross-tension, and pillow tests. Tables, micrographs, graphs. 8 ref. (K3, K9, Ni)

161-K. Moisture in Low-Hydrogen Welding Electrodes. C. DeRop and H. Schmidt-Bach. *Welding Journal,* v. 33, Jan. 1954, p. 39S.

Previously abstracted from *Stahl und Eisen.* See Item 704-K, 1953. (K1)

162-K. An Investigation of Welded Rigid Connections for Portal Frames. A. A. Toprac. *Welding Journal,* v. 33, Jan. 1954, p. 40S-56S; disc., p. 56S.

Tests of 11 typical knees used in welded single-span steel rigid frames. Evaluates each type and suggests improvements. Chart, diagrams, graphs, photographs, tables. 6 ref. (K general, T26)

163-K. Core Wires for Welding Electrodes. K. L. Zeyen. *Draht (English Ed.),* 1953, no. 17, Dec., p. 19-24.

Official regulations in various countries for core wires of bare and coated rods for arc welding of ferrous materials. Tables. 16 ref. (K1)

164-K. (Russian.) **Multi-Electrode Automatic Welding and Building up Under a Flux.** N. P. Emel'ianov, A. V. Obukhov, and D. A. Dul'chevskii. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 73-78.

Increased productivity of method. Diagrams, photographs, tables. (K1)

165-K. (Russian.) **Increasing Impact Strength of Gas Welds.** A. N. Shashkov, T. S. Khromova and S. S. Vaksman. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 8185.

High managense content in silicon steel welding rods was found to increase strength and plasticity of the weld. Tables, micrographs, graphs. 3 ref. (K2, Q6, Ti, AY)

166-K. (Russian.) **Cold Welding of Aluminum.** I. B. Baranov. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 86-89.

High productivity and simplicity. Permits joining of different metals. Diagrams, graphs, photographs, table. (K5, Al, Cu)

167-K. New Developments in Sigma Welding of Carbon Steels. I. From a paper by T. McElrath and R. T. Telford. *Canadian Metals,* v. 17, Jan. 1954, p. 38, 40-41.

Shielded inert-gas metal-arc welding was first applied mainly to nonferrous materials, but progress has been made in welding carbon steel. Tables, graph. (K1, CN)

168-K. The Electric Arc and the Welding Engineer. H. West. *Institution of Electrical Engineers, Proceedings,* v. 101, pt. 1, no. 127, Jan. 1954, p. 21-22.

Abstract of address delivered at Manchester, Oct. 1953. Problems which arise in electric welding. (K1)

169-K. Multipass Welding Increases Ductility. F. W. Myers, Jr. *Iron Age,* v. 173, Jan. 21, 1954, p. 104-105.

Refinement of weld grain structure by repetitive heating and cooling in multipass welding produces many desirable characteristics. Photograph, photomicrograph. (K6, CN)

170-K. Inert-Gas Welding Cuts Cost of SAE 1020 Dolly Wheels. D. V. Wilcox. *Iron Age,* v. 173, Jan. 28, 1954, p. 118-119.

Equipment and techniques of process. Photographs. (K1, CN)

171-K. Huge Casting Repaired by Sigma Welding Process. E. R. Stanson. *Modern Machine Shop,* v. 26, Feb. 1954, p. 194, 196.

Application of the "shielded inert-gas metal-arc" welding process in repairing a 6500-lb. aluminum casting. Photograph. (K1, Al)

172-K. Semiautomatic Welder Adapted to Magnetic Flux. R. A. Hand. *Oil and Gas Journal,* v. 52, Feb. 1, 1954, p. 88-89.

Design and operation. Photographs, diagram. (K1)

173-K. Increased Productivity With Carbides. II. Proper Brazing Techniques. Guy Monacelli. *Screw Machine Engineering,* v. 15, Feb. 1954, p. 51-52, 54.

Brazing of carbide tips to steel shanks. Photographs. (K8, G17)

174-K. The Welding of Nickel Alloy Steels. II. *Steel Processing,* v. 40, Jan. 1954, p. 39-47.

Equipment and techniques employed in various processes. Tables, graphs. 4 ref. (K general, AY)

175-K. 77 Years of Resistance Welding. I. Preston M. Hall. *Welding Engineer,* v. 39, Feb. 1954, p. 54-55.

Historical summary. Photographs. (To be continued.) (K3)

176-K. New Arc Welding Process for Cast Iron. K. K. Khrenov and F. S. Vol'fovskaya. Henry Brutcher, Altadena, Cal., Translation no. 2919, 10 p. (From *Avtogennoe Delo,* v. 23, no. 1, 1952, p. 3-6.)

Previously abstracted from the original. See item 477-K, 1952. (K1, Q5, CI)

177-K. (French.) **Welded Construction of Electric Locomotives.** P. Fromaget. *Revue de la Soudure (Brussels),* v. 9, no. 4, 1953, p. 157-168.

Problems of welding locomotive frames. Remedial measures. Photographs, diagrams. (K general, T23)

178-K. (French.) **Code Project for the International Symbolization of Coated Electrodes for Arc Welding of Mild Steels and Low-Alloy High-Strength Steels.** *Revue de la Soudure (Brussels),* v. 9, no. 4, 1953, p. 179-183.

Classification consists of degree of penetration, mechanical characteristics and operating conditions. Diagrams, tables. (K1, AY, CN)

179-K. (Photocopy.) **Literature Review and Industrial Survey of Brazing.** Armour Research Foundation, for U. S. Army Ordnance Corps. 193 frames. June 1952. Available from Library of Congress, PB 112027, Washington 25, D. C. Microfilm $7.00. Enlargement Print $26.25.

A summary of information on all fundamentals of this method of joining ferrous and nonferrous metals. (K8)

180-K. (Pamphlet.) **Brazing Titanium to Titanium and to Mild and Stainless Steels.** Battelle Memorial Institute, for Wright Air Development Center. 38 p. Nov. 1952. Available from OTS, P.B. 111244, U. S. Dept. of Commerce, Washington 25, D. C. $1.00. (K8, Ti, SS)

181-K. (Book.) **Adhesives for Wood.** R. A. G. Knight. Royal Aeronautical Society Monographs on Metallic and Other Materials. v. III. 242 p. 1952. Chapman and Hall Ltd., 37 Essex St., London W.C. 2, England. $3.75

Deals with a particular aspect of the age-old problem of how to join components. Covers principally components made of wood but joining of wood to metals and plastics is also considered. (K12)

L

Cleaning, Coating and Finishing

132-L. A Simple Reproducible Method for Determining Metal Cleaning Efficiency. Arnold Miller and Edward A. Hedman. *ASTM Bulletin,* 1953, no. 194, p. 51-52.

Simple test procedure for screening metal cleaners, which can be used for determining optimum cleaning cycles for horological components. Photographs. (L10, L12)

133-L. Corn Product Controls Corrosion With Asphaltic Coating. *Chemical Processing,* v. 17, Jan. 1954, p. 72-79.

Coating of steel structures and surfaces of equipment. Coating affords protection from effects of highly corrosive, moist salt air and provides excellent insulation when impregnated with cork. Photographs. (L26, R3)

134-L. Porcelain Enamels and Ceramic Coatings, Prime Inhibitors of Metal Corrosion. Dwight G. Bennett. *Corrosion,* v. 10, Jan. 1954, p. 13-20; disc., p. 20.

Presents and evaluates test methods. Examples of coating effectiveness and areas in which coatings could be used to advantage. Photographs, tables, graphs. (L27)

135-L. Finishes for Communications Equipment With Special Reference to Electroplate Coatings. E. C. J. Marsh. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 69-88 + 8 plates.

Treatment of subject in general, intentionally avoiding technical details as far as possible. Tables. (L17, Zn, Cd, Ni, Cr, Al, Sn)

136-L. Some Factors in Spray-Silvering. P. B. G. Upton, G. W. Soundy and G. E. Busby. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 103-113 + 1 plate.

Particular process developed for use in electrotyping and employing a solution of formaldehyde for reduction of silver ammonio-nitrate solution. Essentials of present method. Tables, graphs. 9 ref. (L23)

137-L. The Physical and Chemical Changes Which Accompany the Polishing of Metals. A. J. W. Moore. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 117-124; p. 125-131 + 6 plates.

Illustrates relationship between phenomena of friction and properties of a polished surface. 21 ref. (L10)

138-L. An Experimental Study of Electropolishing. J. Edwards. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 133-148; disc., p. 149-154 + 2 plates.

Experimental study of smoothing efficiencies in electropolishing. Work is part of a full investigation of mechanism of electropolishing which is to be published elsewhere. Graphs, diagrams. 8 ref. (L13)

139-L. The Properties of Metallic Coatings Produced by Evaporation and Sputtering. S. Tolansky. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 155-165.

Similarity of metal films produced by cathodic sputtering and by thermal evaporation. Diagrams, graph, photograph. (L25)

140-L. Practical Considerations in the Application of Vacuum Coating for Metal Finishing. L. Holland. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 167-178; disc., p. 187-193 + 4 plates.

Includes diagrams, graph. 8 ref. (L25)

141-L. Lacquering to Obtain Brilliance and Metallic Lustre. H. H. Vevers and G. E. Gardam. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 179-186; disc., p. 187-193.

Types of lacquer used for base and top coats and methods of application and stoving. Graph, diagram. (L26)

142-L. The Electrodeposition of Tin-Antimony Alloys From Chloride-Fluoride Electrolytes. J. W. Cuthberton and N. Parkinson. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 195-201.

Alloys of tin and antimony containing up to about 45% antimony can be satisfactorily deposited from solutions containing chlorides of the two metals, a fluoride and an addition agent. Graphs, tables. 5 ref. (L17, Sb, Sn)

143-L The Plating of Aluminium Articles as a Production Process. A. W. Wallbank. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 209-218; disc., p. 218-227.

Aluminum as a basis metal, problems and methods of plating and the history of the electrolytic (Vogt) process. Tables. 11 ref. (L17)

144-L. Vitreous Enamelling in Sweden, Denmark and Finland. J. H. Gray. *Foundry Trade Journal,* v. 95, Dec. 10, 1953, p. 725-728, disc., p. 728-729.

Equipment and techniques employed. Photographs. (L27)

145-L. Versatile Setups Finish Diecastings Faster. Frank E. Beers. *Iron Age,* v. 172, Dec. 24, 1953, p. 73-75.

Economy and efficiency result from close supervision and quality control. Photographs. (L general, S12, Zn)

146-L. New Corrosion Resistant Coating Protects Cast Iron Coolers. J. J. Obrzut. *Iron Age,* v. 172, Dec. 24, 1953, p. 76-77.

Cooling and condensing sections are being protected with a special aluminum coating. Coating is a mixture of aluminum powder in a special plastic vehicle. Photographs. (L26, Al, CI)

147-L. New Plating Process Deposits Nickel Brighter, Faster. C. G. Rising. *Iron Age,* v. 172, Dec. 24, 1953, p. 78-81.

Features built into process overcome shortcomings previously experienced and provide easy-to-control bath. Operating ranges for temperature and current density are broad. (L17)

148-L. Hard Surfacing. Coated Diesel Engine Valves Outlast Originals. *Iron Age,* v. 172, Dec. 24, 1953, p. 88.

Includes photographs. (L24)

149-L. The Protection of Iron and Steel by Metallic and Non-Metallic Coatings. II. J. C. Hudson and J. F. Stanners. *Iron and Steel Institute, Journal,* v. 175, Dec. 1953, p. 381-390 + 6 plates.

Second report on a series of tests on protection of structural steel by metallic coatings and by nonmetallic coatings other than oil paints. Graphs, tables, photograph. 6 ref. (L general)

150-L. The Production of Fine Wires by Electrolytic Polishing. H. R. Haines and B. W. Mott. *Journal of Scientific Instruments,* v. 30, Dec. 1953, p. 459-460.

Simple apparatus for reducing diameter of brittle or easily oxidized metal wires by an electrolytic polishing method. Diagram, table. 3 ref. (L13)

151-L. Plating Tin on Aluminium. J. M. Bryan. *Metal Industry,* v. 83, Dec. 18, 1953, p. 502-504.

Attempts to obtain by simple immersion a satisfactory deposit of tin on aluminum. Tables, graph. 1 ref. (L17, Sn, Al)

152-L. Draw Bushing Life Extended. *Metal-Working,* v. 10, Jan. 1954, p. 12-13.

Hard chromium plate prevents "pickup" of stainless stock. Photographs. (L17, F1, G21)

153-L. Underground Corrosion. V. New Techniques in Control. O. C. Mudd. *Oil and Gas Journal,* v. 52, Jan. 11, 1954, p. 127.

Need for better coatings, including greater resiliency and good bonding qualities. Graph. (L26, R8)

154-L. 1953—A Year of Accomplishment. H. Preuss. *Organic Finishing,* v. 14, Dec. 1953, p. 6-11.

Reviews industrial developments in the finishing field. Metal cleaning, new coatings, special decorative finishes, application methods, corrosion and miscellaneous products. Photographs. (L general)

155-L. Protective Coatings and Linings for Water Treating Equipment. James Boyd Smith. *Organic Finishing,* v. 14, Dec. 1953, p. 12-16.

Types of water treatment in current use and corrosion prevention measures employed. Photographs. (To be continued.) (L general, R4)

156-L. Precision Barrel Finishing. Malcolm M. Maynes. *Plating,* v. 41, Jan. 1954, p. 55-60.

Equipment, operating procedures and applications. Photographs. (L10)

157-L. A.E.S. Research Report Project no. 13. The Nature, Cause and Effect of the Porosity in Electrodeposits. I. The Porosity of Electrodeposits. Fielding Ogburn and Asaf Benderly. *Plating,* v. 41, Jan. 1954, p. 61-65.

Methods of studying porosity and corrodibility of electrodeposits. Photograph, micrograph, diagrams, tables, graph. 3 ref. (To be continued.) (L17)

158-L. Special Coatings for Metals Used at High Temperatures. A. H. Sully. *Product Engineering,* v. 25, Jan. 1954, p. 135-141.

Diffusion, refractory and low-emissivity coatings. Photographs, graphs. 3 ref. (L15, L27)

159-L. Barrel Finishing of Metal Products. The Use of a Slurry in Barrel Finishing. H. Leroy Beaver. *Products Finishing,* v. 18, Jan. 1954, p. 24-26, 28, 30, 32, 34.

Slurry; its use in finishing procedures. (L10)

160-L. Spotlighting Finishing Progress. Animal Fats in Hot-Dip Tinning. C. Fred Gurnham. *Products Finishing,* v. 18, Jan. 1954, p. 48, 50, 52, 54, 56, 58, 60, 62, 64.

Requirements for tinning oils. Progress on development of substitutes for imported palm oil. Diagram. (L16, Sn)

161-L. Insulation of Electrical Sheets by Mica-Phosphate Coatings. A. Wüstefeld. Henry Brutcher, Altadena, Cal., Translation no. 3092, 6 p. (From *Werkstoffe und Korrosion,* v. 2, no. 1, 1951, p. 16-17.)

Previously abstracted from original. See item 297-L, 1951. (L14, ST, SG-p)

162-L. Methods for Using Zinc Economically in Hot-Dip Galvanizing. H. Rückemesser. Henry Brutcher, Altadena, Cal., Translation no. 2937, 7 p. (From *Draht,* (German Ed.) v. 2, no. 8, Aug. 1951, p. 221-222.)

Steps recommended for minimizing formation of dross and zinc ashes in hot dip galvanizing and hints as to possibilities of recovering their zinc content right at galvanizing shop. (L16, Zn, CN)

163-L. General Principles. William Blum and Walter R. Meyer. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 1-46.

Summarizes principles and methods that find application in plating of various metals. Photomicrographs, photographs, table. 115 ref. (L17)

164-L. Methods of Control. Ralph A. Schaefer, Henry J. Sedusky and Betty Luce. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 47-63.

Tests and their significance in specification plating. Tables, photograph. 21 ref. (L17)

165-L. Alloy Plating. Charles L. Faust. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 64-97.

Important role that alloy plating can assume; operating principles. Graphs, micrographs, photographs, diagram. 101 ref. (L17)

166-L. Brass. Leonard E. Weeg and Harold J. Wiesner. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 98-115.

Principles, bath composition and functions of the constituents, bath operation, preparation of basis metal and maintenance and control. Tables. 49 ref. (L17, Cu)

167-L. Cadmium. K. G. Soderberg and Leon R. Westbrook. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 116-134.

Almost every plating bath characteristic of consequence is in favor of cyanide cadmium bath: its ability to give a dense, fine-grained deposit which may be made highly lustrous and reflective by use of brighteners that are stable in bath; high and easily balanced anode and cathode efficiencies; excellent covering power and good plate distribution on recessed articles. (L17, Cd)

168-L. The Chromium Plating Process. George Dubpernell. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 135-177.

Methods of obtaining thin coatings for decorative purposes and "hard" or industrial deposits. Tests and control measures. Tables, graphs, photographs. 199 ref. (L17, Cr)

169-L. Properties of Chromium Plate. Cloyd A. Snavely and Charles L. Faust. Paper from "Modern Electro-

plating." John Wiley & Sons, Inc., p. 177-187.

Chromium plate is unique among metal plates extensively used in commerce because of important bearing the structure of the plate has upon its uses and performance. Actually, many variations in structure and physical properties can be obtained by proper adjustment of plating conditions and post-plating treatments. Theory underlying these structural characteristics is reasonably complete and outlined in this paper. Micrographs, photographs, table. 24 ref. (L17, Cr)

170-L. Cobalt. Henry B. Linford. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 188-193.

Principles, functions of constituents of bath, operating conditions, maintenance and control, preparation of basis metals and finishing deposits and tests of deposits. Tables. 23 ref. (L17, Co)

171-L. Rochelle Copper. A. Kenneth Graham and Harold J. Read. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 194-213.

Rochelle copper, bath constituents, function of constituents of bath, operating conditions and characteristics of the rochellé-cyanide bath, maintenance and control, anodes, preparation of the basis metals and test of deposits. Tables, graph. 47 ref. (L17, Cu)

172-L. High Efficiency Cyanide Copper. R. R. Bair and D. A. Swalheim. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 213-225.

Functions of bath constituents, bath formulations, operating procedures, commercial plating and testing of deposits. Diagrams. 13 ref. (L17, Cu)

173-L. Pyrophosphate Copper. J. E. Stareck. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 225-231.

Principles, bath composition, operating conditions, maintenance and control, anodes, preparation of basis metal and tests of deposit. Tables. 21 ref. (L17, Cu)

174-L. Acid Copper Electroplating and Electroforming. William H. Safranek and J. Homer Winkler. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 231-251.

History and development, principles, functions of bath constituents, operating conditions, physical properties and structure of deposits, maintenance and control, anodes, equipment, tests of deposits, preparation of basis metals and mold and mandrels for electroforming. Tables, photographs. 99 ref. (L17, L18, Cu)

175-L. Gold. Louis Weisberg and A. Kenneth Graham. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 252-266.

Resistance to tarnish, oxidation at elevated temperatures and attack by most chemicals, combined with relative scarcity, high price and pleasing appearance, have limited gold to specific uses. Processes and tests. Tables. 26 ref. (L17, Au)

176-L. Indium. Henry B. Linford. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 267-270.

Chief application of indium plating is as a diffusion alloy in aircraft engine bearings. Tables. 19 ref. (L17, In)

177-L. Iron. C. T. Thomas and V. A. Lamb. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 271-281.

Iron plating is one of the minor factors in plating world. Although present applications of iron plating are limited, there is a continuing interest in electroforming. Typical baths and controls. Tables, photographs. 30 ref. (L17, L18, Fe)

178-L. Lead. A. H. Du Rose and William Blum. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 282-298.

Appearance and properties of lead limit its commercial use in electroplating largely to the field of corrosion protection. Tables, graph. 53 ref. (L17, Pb)

179-L. Nickel. W. L. Pinner, K. G. Soderberg and W. A. Wesley. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 299-355.

Covers use of nickel plating to protect metallic objects from corrosion, especially steel, brass and zinc die castings and, to a smaller extent, aluminum and magnesium alloys. Good appearance is usually important, and therefore nontarnishing chromium is usually applied on top of the nickel. Less frequently, gold or brass with a lacquer finish is used as a final coating. On account of its mechanical properties, nickel plating is used to some extent to repair worn parts, and for electroforming of printing plates, phonograph masters, sheet, tube, screen and many other articles. Methods and controls. Graphs, diagrams, tables, photomicrographs. 172 ref. (L17, Ni, Zn, Al, Mg)

180-L. Platinum Group Metals. K. Schumpelt. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 356-366.

The group of platinum metals is comprised of platinum, iridium, osmium, palladium, rhodium, ruthenium. Of these only platinum, palladium, and rhodium have found practical applications in the field of electroplating. Tables, graphs. 15 ref. (L17, EG-c, Pt, Ir, Os, Pd, Rh, Ru)

181-L. Silver. N. E. Promisel. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 367-386.

Silver plating which has to do only with deposition of smooth, dense, adherent deposits on a metal or alloy basis metal and does not include electroforming, electrorefining, etc. Tables. 29 ref. (L17, Ag)

182-L. Stannate Tin. Fred Bauch and F. F. Oplinger. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 389-410.

Discussion in two parts, one dealing with conventional sodium stannate plus sodium hydroxide system, the other with the potassium stannate plus potassium hydroxide system. Graphs. 38 ref. (L17, Sn)

183-L. Acid Tin. Paul R. Pine and A. H. DuRose. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 410-428.

Principles, sulfate and fluoborate solutions and tests of deposits. Photographs, tables. 67 ref. (L17, Sn)

184-L. Immersion Tinning. Frederick A. Lowenheim. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 429-434.

Two important industrial uses of immersion tin coatings. The so-called "liquor finish" on steel wire and tinning of aluminum alloy pistons for internal combustion engines and tinning the inside of copper tubing, which would not be susceptible to ordinary electroplating methods. Tables. 27 ref. (L17, L16, Sn)

185-L. Tin Alloys. Frederick A. Lowenheim. Paper from "Modern Electroplating." John Wiley & Sons, Inc., New York, p. 434-442.

Tin-copper or speculum, tin-nickel and tin-zinc alloy plating processes. Tables. 30 ref. (L17, Sn)

186-L. Acid Zinc. Ernest H. Lyons, Jr. and Hamnett P. Munger. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 444-459.

Development of electrogalvanizing, sulfate and chloride-type acid baths, zinc-ammonia bath, sulfate electroplating baths for strip and wire, zinc anodes, analytical methods, preparation of basis metals and tests of deposits. Tables. 42 ref. (L17, Zn)

187-L. Cyanide Zinc. R. R. Bair and L. J. Schustik. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 460-482.

The matte zinc deposit is generally used where rust protection or ductility is of prime importance, whereas the bright plating baths find application on articles requiring both corrosion protection and eye appeal. Graphs, tables. 30 ref. (L17, Zn)

188-L. Uncommon Metals. Frederick A. Lowenheim. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 483-510.

Review of published work concerning many metals which are not being, or cannot be, practically electrodeposited at present. 314 ref. (L17, Ac, Al, Sb, As, Be, Bi, Ca, Ce, Nb, Ga, Ge, Hf, La, Mg, Mn, Hg, Mo, Po, Pa, Re, Se, Ta, Te, Tl, Th, Ti, W, U, V, Zr)

189-L. Aluminum Alloys. Fred Keller. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 511-524.

Of different methods available, the zinc immersion method is now considered the most satisfactory and practical method for plating virtually all the different aluminum alloys with various other metals. Tables, diagrams, graph. 8 ref. (L17, Al, Mg, Zn)

190-L. Magnesium Alloys. H. K. DeLong. Paper from "Modern Electroplating." John Wiley & Sons, Inc., p. 524-535.

Covers cleaning and conditioning of magnesium surfaces, the zinc coating process, plating procedures and characteristics of plated finishes on magnesium. Photographs, tables. 6 ref. (L17, Cu, Ni, Cd, Cr, Ag, Mg, Cu, Zn)

191-L. (German.) **Phosphate Coating of Aluminum.** H. Ketterl. *Aluminium*, v. 29, no. 12, Dec. 1953, p. 509-513.

Interrelation of protective layer and temperature of bath. Composition and quality of layers. Tables, graphs. 4 ref. (L14, Al)

192-L. (German.) **The Anodic Treatment of Strips and Wires.** E. Herrmann. *Aluminium*, v. 29, no. 12, Dec. 1953, p. 513-519.

Uniform anodic treatment of strips, multiple-stage formation of aluminum-condenser strips and composition of the electrolyte. Photographs, graphs, diagrams. (L19, Al)

193-L. (German.) **Surface of Sheet Metal and Pot Galvanizing.** H. Bablik. *Metall*, v. 7, nos. 21-22, Nov. 1953, p. 849-851.

Experiments have shown that any disturbance of surface grain of iron greatly increases pick-up of zinc and loss of iron. Use of flux to reduce loss of iron. Diagrams, tables, micrographs. 5 ref. (L16, Fe, Zn)

194-L. (German.) **Examples on the Application of the Spray Method of Zinc Coating in Germany.** R. Weber. *Metall*, v. 7, nos. 21-22, Nov. 1953, p. 852-854.

Principle, application and effectiveness as a rust preventive. Photographs, tables. 3 ref. (L23, Zn)

195-L. (German.) **Lead Cyanamide, a Rust-Resisting Pigment.** W. Roever. *Metall*, v. 7, no. 21-22, Nov. 1953, p. 876-877.

Properties and uses. (L26, Pb)

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196-L. (German.) **Effect of Pickling and Steam Treatment on Corrosion Resistance of Aluminum.** H. Neunzig. *Metalloberfläche,* Ausgabe B, v. 5, no. 12, Dec. 1953, p. 181-184.

Results of numerous tests show that aluminum ware is best pickled in an acid mixture. Exposure of bright aluminum to steam was shown to prevent discoloration and increase corrosion resistance. Tables, photographs. 5 ref. (L12, R general, Al)

197-L. (German.) **Some Individual Reactions on the Metal-Water Boundary Layer.** Fritz Tödt. *Metalloberfläche,* Ausgabe A, v. 7, no. 12, Dec. 1953, p. 184-185.

Minute parts of a mono-atomic layer and true surface of the electrode can be measured by measuring amperage of generated galvanic current. The pH value of an aqueous solution can be determined directly at metal surface by determining effect of current density on potential. 3 ref. (L17, R1)

198-L. (German.) **The Use of Silicones in Treatment of Metal Surfaces.** Fritz Ohl. *Metalloberfläche,* Ausgabe A, v. 7, no. 12, Dec. 1953, p. 185-188.

Mechanical and chemical properties which make silicones valuable as corrosion inhibitors, high-temperature lubricants, paints, polishes and cements. (L26)

199-L. (German.) **The Causes of Formation of Semispherical Bubbles When Copper-Plating Die-Cast Zinc in Hot Baths.** W. Briese. *Metalloberfläche,* Ausgabe B, v. 5, no. 12, Dec. 1953, p. 188.

Bubbles are caused by evaporation of residual solvent through the pores. Means of avoiding this defect. (L17, Cu, Zn)

200-L. (German.) **A Method of Producing Uranium Oxide Films on Aluminum.** Siegfried Skorka. *Naturwissenschaften,* v. 40, no. 23, 1953, p. 605.

A simplified procedure. Graph. 2 ref. (L14, Al)

201-L. (Russian.) **Liquid-Abrasive Working of Metals.** K. P. Kochetov. *Stanki i Instrument,* v. 24, no. 10, Oct. 1953, p. 19-23.

Method of cleaning castings, forgings and rolled products which increases corrosion resistance. Tables, diagrams, photograph. (L10)

202-L. (Russian.) **Nature of the Phenomenon of the "Hard Tearing Off' of Cathode Zinc.** A. I. Levin, A. V. Pomosov and T. A. Tkachenko. *Zhurnal Prikladnoi Khimii,* v. 26, no. 12, Dec. 1953, p. 1238-1244.

Factors accompanying electrolysis process and their influence on properties of aluminum surface. Tables, diagram. 9 ref. (L17, Zn, Al)

203-L. (Russian.) **Corrosion of Aluminum Refrigerator Condensers in the Bath for the Electrodeposition of Zinc.** A. I. Levin, A. V. Pomosov and T. N. Rogatkina. *Zhurnal Prikladnoi Khimii,* v. 26, no. 12, Dec. 1953, p. 1245-1251.

Studies on conditions of electrochemical oxidation of aluminum to obtain protective films. Tables. 4 ref. (L14, Al, Zn)

204-L. (Russian.) **Erosional Stability of Anodic Oxide Films on Aluminum Alloys.** N. D. Tomashov, A. V. Shreider and A. V. Bialobzheskii. *Zhurnal Prikladnoi Khimii,* v. 26, no. 12, Dec. 1953, p. 1252-1257.

Influence of anodic oxidation on alteration of roughness of aluminum alloy surfaces. Diagrams, tables, graphs. 5 ref. (L19, Al)

205-L. An Evaluation of the Use of the Refractory Oxides Al_2O_3 and SiO_2 in Eliminating a Gas-Produced Enamel Defect. Richard G. Rion. *American Ceramic Society, Bulletin,* v. 33, Jan. 1954, p. 16-20.

Includes graphs, tables. 12 ref. (L27, CI, CN)

206-L. New Al-Fin Developments Create New Design Opportunities. Randolph Hawthorne. *Aviation Age,* v. 21, Jan. 1954, p. 26-27.

Uses of molecular bonding of aluminum to steel are discussed. Photographs. (L22, Al, ST)

207-L. Chromium Electrodeposition. Lois Jean Frolen. *Chemistry,* v. 27, Jan. 1954, p. 34-39.

Investigation to find satisfactory theory concerning mechanism of chromium electrodeposition on a solid cathode. Photograph, phase diagrams, tables. (L17, Cr)

208-L. Metal Finishing in 1953: Some Highlights of the Year in Industry. Autolycus. *Electroplating and Metal Finishing,* v. 7, Jan. 1954, p. 4-7.

Present trend toward mechanization. Developments in nickel-chromium plating and other processes. (L general, Ni, Cr)

209-L. An Introduction to Throwing Power and Covering Power in Electroplating Solutions. I. R. Pinner. *Electroplating and Metal Finishing,* v. 7, Jan. 1954, p. 9-15.

Definitions and methods of testing. Diagrams, graphs. (To be continued.) (L17)

210-L. Porosity of Sprayed Coatings. III. Impregnation and Organic Finishing of Sprayed Coatings. D. de Paauw. *Electroplating and Metal Finishing,* v. 7; *Metal Spraying,* v. 4, Jan. 1954, p. 35, 37-38.

Process of sealing pores of sprayed metals to improve corrosion resistance. 33 ref. (L23)

211-L. Adherence Tests for Porcelain Enamels and High Temperature Ceramic Coatings. I. George Warren. *Finish,* v. 11, Jan. 1954, p. 33-35, 104-105.

Destructive-type tests and complete information on Porcelain Enamel Institute standard adherence test. Photographs, diagrams, graph, table. 9 ref. (L27)

212-L. The Finishing Story. Stanley Burns and Clark Luter. *Finish,* v. 11, Jan. 1954, p. W23-W28, W48.

Material quality control methods, production equipment, and processing routine for finishes. Photographs, flow sheet. (L general, S12)

213-L. What's New in Pipe Coatings? George D. Lain. *Heating, Piping & Air Conditioning,* v. 26, Jan. 1954, p. 164-165.

New plastics with metallic coating are proving to be successful in extending service life. Photograph, diagram. (L general)

214-L. Tests for Use on Vitreous Enamel Finishes. *Industrial Finishing (London),* v. 6, Dec. 1953, p. 346, 348.

Eight simple tests. (L27)

215-L. Finishing Titanium. Thomas A. Dickinson. *Industrial Finishing (London),* v. 6, Dec. 1953, p. 356-358.

Vacuum deposition, anodizing, and ceramic coating. Photographs. (L19, L25, L27, Ti)

216-L. How Airplane Parts Are Heat Treated to Withstand High Temperatures. *Industrial Gas,* v. 32, Jan. 1954, p. 6-7, 22-23.

Ryan Aeronautical Co. builds exhaust systems and other components for jet, piston, and rocket engines. Gas-fired ovens effect perfect bond of ceramic coating on metal, prolonging its life. Photographs. (L27, SG-h)

217-L. Tin-Nickel and Nickel-Chromium Coatings: Some Comparative Corrosion Tests. S. C. Britton and R. M. Angles. *Institute of Metal Finishing, Bulletin,* v. 3, Winter, 1953, p. 259-280.

Materials, methods of test, and results. Tables, photographs. 4 ref. (L17, R11, Sn, Ni, Cr)

218-L. Reducing Costs in the Paint Shop. A. Rice-Williams. *Institute of Metal Finishing, Bulletin,* v. 3, Winter, 1953, p. 281-287. (L26)

219-L. Semiautomatic Plating Pays Where Sizes, Shapes Vary. T. Stoddard. *Iron Age,* v. 173, Jan. 14, 1954, p. 122-124.

Semi-automatic plating offers economy, high production, and good quality in shops where parts vary in shape, size, and finish. Photographs, diagram. (L17)

220-L. Conserve Critical Materials by Ceramic Coating of Jet Engine Hot Parts. J. V. Long. *Machine and Tool Blue Book,* v. 49, Jan. 1954, p. 244-247, 250, 252-254, 256-257.

Role of protective coatings in making possible substitution of lower alloys at high temperatures. Photographs. (L27)

221-L. Finishing Systems for Magnesium. Hugo A. Barbian. *Materials Methods,* v. 39, Jan. 1954, p. 102-105.

Requirements for finishing magnesium, finishing systems currently used and their service experience and new developments for finishing magnesium. Photographs, diagrams, tables. (L general, Mg)

222-L. Electroplating and Soldering as Allied Processes. Alan Whittaker. *Mechanical World and Engineering Record,* v. 134, Jan. 1954, p. 26-28.

Production of many components is facilitated by using processes of electroplating and soldering in combination. Methods are outlined which insure maximum efficiency when both processes are included in production layout. (L17, K7)

223-L. Technical Developments in 1953. Nathaniel Hall. *Metal Finishing,* v. 52, Jan. 1954, p. 52-61.

A year's progress in cleaning, pickling, polishing, metallic coatings, metallizing, testing, and control. 311 ref. (L general)

224-L. Electroplating in Turkey and Cyprus. Marvin Rubinstein. *Metal Finishing,* v. 52, Jan. 1954, p. 64-69.

A traveller's-eye view. Photographs. (L17)

225-L. Plating on Aluminum. Bernard E. Bunce. *Metal Finishing,* v. 52, Jan. 1954, p. 70-73, 76.

Phosphoric acid anodizing pretreatment. Table, diagram, photograph, micrograph. (L17, L19, Al)

226-L. Here's How Interstate Lines Pipe in Place to Prevent Internal Corrosion. M. B. Grove. *Oil and Gas Journal,* v. 52, Jan. 18, 1954, p. 109-110.

Technique of in-place plastic lining of pipe. Diagram. (L26)

227-L. New Methods for Engine and Compressor Maintenance. Robert S. Ridgway. *Petroleum Refiner,* v. 33, Jan. 1954, p. 110-115.

Useful methods affecting engine and compressor maintenance including resleeving power cylinders, metal spray conditioning, chromium plating cylinder walls, and new shop gadgets. Photographs. (L17, L23)

228-L. The Scope of Hot Spraying. H. J. Testro. *Product Finishing,* v. 6, Dec. 1953, p. 48-55.

Theory and practice of hot spraying of paints. Benefits and limitations. Photographs. (L26)

229-L. Review of Spray Guns. *Product Finishing,* v. 6, Dec. 1953, p. 93-102.

Assists firms in making choice of most suitable paint guns for particular applications. Photographs. (L26)

230-L. Electroless Plating in Production. Thomas A. Dickinson. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 19-21, 30.

Processes in a large-scale production plant. Photographs. (L16)

231-L. Regeneration of Spent Pickle Liquor. B. P. Martinez. *U. S. Bureau of Mines, Information Circular* 7672, Dec. 1953, 18 p. + 4 plates.

Proposed process is based largely on negative solubility slope of ferrous sulfate in temperature range 160 to 240° F. Diagrams. 21 ref. (L12)

232-L. Galvanizing Furnace With Combined Heating by Radiation and Circulation. H. Rückemesser. *Draht (English Ed.),* 1953, no. 17, Dec., p. 41-42.

Design, operating characteristics, advantages, and difficulties. (L16, Zn)

233-L. (Japanese.) **Examination of Foreign Paints for Bicycles.** Kichinosuke Ohhashi and Yoshindo Matsuda. *Reports of the Government Chemical Industrial Research Institute,* Tokyo, v. 48, no. 8, Oct. 1953, p. 307-310.

Comparison of modern products from USA, England, India, and Japan. Tables. (L26)

234-L. (Russian.) **Test in Production of Master Specimens of Accurate Surface by the Electroforming Method.** M. G. Boguslavskii. *Stanki i Instrument,* v. 24, no. 11, Nov. 1953, p. 19-20.

Method reproduced surface contour with good accuracy. Specimens are corrosion and wear resistant. Photographs, diagrams. (L18)

235-L. (Russian.) **Investigation of Cathode Processes During the Electrodeposition of Copper From Complex Electrolytes.** E. A. Ukshe and A. I. Levin. *Zhurnal Fizicheskoi Khimii,* v. 27, no. 9, Sept. 1953, p. 1396-1403.

Effects of current density and various additives. Table, graphs. 18 ref. (L17, Cu)

236-L. Anodic Behavior of Aluminum and Its Alloys in Sulfuric Acid Electrolytes. Ralph B. Mason and Phyllis E. Fowle. *Electrochemical Society, Journal,* v. 101, Feb. 1954, p. 53-59.

Main factors affecting rate of solution of anodic oxide coatings on aluminum as they are being formed. Graphs. 13 ref. (L19, Al)

237-L. The Mechanism of the Anodic Formation of Lead Chromate. Carl Wagner. *Electrochemical Society, Journal,* v. 101, Feb. 1954, p. 60-62.

Diffusion and convection processes during the electrolysis of a solution of sodium chromate and sodium chlorate between lead electrodes. Graphs. 11 ref. (L19, Pb, Cr)

238-L. Inspection of Electroplated Aircraft Parts. P. Skeggs. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 15-26.

General inspectional requirements of D.T.D. specifications covering plating of aircraft parts. Sampling methods of testing and particular requirements of certain specifications. Surface treatment of zinc and cadmium coatings. Graphs, diagrams. (L17, S22, Cr, Ni, Ag, Zn, Cd)

239-L. A Non-Electrolytic Smoothing Treatment for Steel. W. A. Marshall. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 27-45; disc., p. 61-68 + 7 plates.

Part I: Work carried out to investigate conditions under which smoothing action takes place, together with results of some preliminary quantitative determinations of type and degree of smoothing achieved. Part II: Qualitative and quantitative investigations of adhesion obtained between smoothed and electrodeposited nickel. Tables, graphs, diagram. 4 ref. (L12, L17, ST, Ni)

240-L. The Nature of the Film Present on Iron After Brightening in Marshall's Solution. A. Hickling, W. A. Marshall and E. R. Buckle. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 47-60; disc., p. 61-68.

Investigation was undertaken with object of obtaining definite proof of existence of film and some indication of its nature, thickness, and mode of formation. Graphs, diagram. 4 ref. (L13, Fe)

241-L. Anodised Aluminium Surfaces for Wear-Resistance. William Campbell. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 273-291 + 2 plates.

Some experimental work in developing commercial production of hard oxide films on aluminum by anodizing, with particular reference to treatment of aluminum alloys of high alloy content. Diagrams, graphs, tables. (L19, Al)

242-L. A Commercial Gas Plating Process. *Electroplating and Metal Finishing,* v. 7, Jan. 1954, p. 16-18.

Principles and techniques of process. Diagram, table. (L15)

243-L. Semi-Automatic Handling Through Plating. *Flow,* v. 9, Feb. 1954, p. 86-87, 100, 102, 104-105.

Operation of semi-automatic system of nickel and chromium plating which increased production and reduced rejects. Photographs, diagram. (L17, Ni, Cr, Cu)

244-L. Developments in Vitreous Enamelling on Steel in the United States. Ernest M. Hommel. *Foundry Trade Journal,* v. 96, Jan. 7, 1954, p. 19-24.

Equipment and process employed. (L27)

245-L. Hard Facts About Hard Facing. John Wischhusen. *Industry & Welding,* v. 27, Feb. 1954, p. 49-53, 55, 84-85.

Equipment and techniques employed. Photographs, diagram. (L24)

246-L. Automatic Setup Buffs Intricate Aluminum Castings. James E. Taylor. *Iron Age,* v. 173, Jan. 21, 1954, p. 108-110.

Complicated aluminum castings are now being buffed automatically with good results. Photographs. (L10, Al)

247-L. Use of Magnetic Amplifiers in Control Circuits. R. T. Lucas. *Iron and Steel Engineer,* v. 31, Jan. 1954, p. 74-75; disc., p. 76-77.

Reports satisfactory application of magnetic amplifiers on loop control of pickle lines. (L12)

248-L. No Polishing Needed. Robert O. Johnson. *Precision Metal Molding,* v. 12, Feb. 1954, p. 54-58, 66.

High-vacuum metallizing on zinc or aluminum die castings. Photographs. (L25, Zn, Al)

249-L. Statistical Quality Control of Plating Operations. J. Forster-Cooper. *Product Finishing,* v. 7, Jan. 1954, p. 48-56.

Ways in which statistical quality control of automatic, semi-automatic, and still-vat plating operations is carried out in a large organization. Graphs, photographs. (L17, S12)

250-L. Hard Chrome Electroplating for Wear Resistance. T. R. Boggess. *Railway Locomotives and Cars,* v. 128, Feb. 1954, p. 67-69.

Description of equipment. Photographs. (L17)

251-L. Metallizing Experience at Two Iowa Plants. I. Marshalltown, Iowa. L. F. Skorczeski. II. Fort Dodge, Iowa. D. D. Douglas. *Sewage and Industrial Wastes,* v. 26, Jan. 1954, p. 89-93.

Surface preparation, equipment and plant experience. (L23)

252-L. Finishes for Metals: Inorganic and Protective Coatings. (Tool Engineering Report.) Robert A. Wason. *Tool Engineer,* v. 32, Feb. 1954, p. 81-88.

Choice and application of finishes. Table, photographs. (L general)

253-L. Turnabout at Rheem. Gilbert C. Close. *Western Machinery and Steel World,* v. 45, Jan. 1954, p. 95-98.

Technique of reversing usual procedure of metal finishing. Raw materials are primed, painted and even lithographed before actual production or fabrication of metal parts is started. Photographs. (L26)

254-L. The Mechanical De-Scaling of Low Carbon Steel Wire Rods. H. F. Sanderson. *Wire Industry,* v. 21, Jan. 1954, p. 53-55.

Design, operating characteristics, advantages and limitations of machine. 1 ref. (L10, CN)

255-L. Plant & Equipment. Continuous Spray Pickling Plant. *Wire Industry,* v. 21, Jan. 1954, p. 56, 59.

Design, construction and operation. Photograph. (L12)

256-L. New Electrosparking Process for the Hard Facing of Cutting Tools. G. P. Ivanov. Henry Brutcher, Altadena, Cal., Translation no. 2821, 13 p. (From *Stanki i Instrument,* v. 22, no. 5, 1951, p. 20-22.)

Previously abstracted from the original. See item 365-L, 1952. (L24, ST)

257-L. (Photocopy.) **Butyl Titanate Heat and Corrosion Resistant Paints.** PB110900. Australia Dept. of Supply, Defence Research Laboratories, Maribyrnong, Victoria. 22 p. 1954. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00. Photostat $3.75.

Special applications and formulations. Conclusion is reached that commercial production of the butyl titanate polymer is well warranted for a rust-proofing material, as a protective coating against corrosion or heat. (L26)

258-L. (Book.) **Electrodepositors' Technical Society, Journal, (Annual Volume),** v. 28, 1951-1952. 291 p. Institute of Metal Finishing, Incorporating Electrodepositors' Technical Society, London, W. C. 1.

Includes 16 papers, individually abstracted. (L17)

259-L. (Book.) **Modern Electroplating.** Sponsored by the Electrochemical Society, Inc. Allen G. Gray, editor. 563 p. 1953. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $8.50.

Consists of 28 papers, individually abstracted. (L17)

260-L. (Book.) **Organic Protective Coatings.** William Van Fischer. 387 p. Rheinhold Publishing Corp., 330 W. 42nd St., New York 36. $7.50

Problems of formulation, specification and application of organic coatings. Fundamental theory and practice of paint as an engineering material. (L26)

261-L. (Book.) **Steel Structures Painting Manual.** Joseph Bigos, editor. **v. I. Good Painting Practice.** 432 p. 1953. Steel Structural Painting Council, 4400 Fifth Ave., Pittsburgh 13, Pa. $6.00.

Surface preparation and painting practices in various industries. Written from the viewpoint of paint users, it is practical encyclopedia of economical and satisfactory painting methods, rather than a technical treatise on paint formulation. Contains 18 chapters plus foreword, glossary, and index. (L26)

M

Metallography, Constitution and Primary Structures

55-M. A Relationship of Microstructure to the Mechanical Properties of White Irons. W. J. Williams. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Dec. 1953, p. 132-134 + 6 plates.

Results of experimental studies. Photographs. 2 ref. (M27, Q general)

56-M. An Electron-Diffraction Investigation of the Structure of Electrodeposited Coatings on Iron Single Crystals. D. J. Evans and M. R. Hopkins. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 229-238; disc., p. 245-251.

Results emphasize importance of effect of composition of plating solution upon the structure of the deposit, since with some solutions, only a polycrystalline deposit has been observed under a variety of plating conditions. Diagrams, graphs, table. 5 ref.
(M26, L17, M22, Zn, Cu, Fe, Ni)

57-M. The Crystal Structure of Electrodeposited Silver. D. N. Layton. *Electrodepositors' Technical Society, Journal,* v. 28, 1951-1952, p. 239-244; disc., p. 245-251 + 1 plate.

Electron-diffraction examination showed this thin deposit to consist of small randomly disposed crystals. Diagrams, table. 17 ref.
(M26, L17, M22, Ag)

58-M. The System Uranium-Lead. B. R. T. Frost and J. T. Maskrey. *Institute of Metals, Journal,* v. 82, Dec. 1953, p. 171-180.

System uranium-lead has been investigated over the whole composition range and up to 1250° C. by micrographic, X-ray and thermal analysis methods. Diagrams, tables, graphs. 13 ref.
(M24, M21, M23, U, Pb)

59-M. New Methods Determine Grain Size Ultrasonically. Nicholas Grossman. *Iron Age,* v. 172, Dec. 31, 1953, p. 72-75.

Nondestructive test for grain size of metal in determining inherent physical character. Tables, oscillographs, graph. (M27, Cu)

60-M. The Iron-Carbon Diagram. R. Whitfield. *Machinery (London),* v. 83, Dec. 25, 1953, p. 1253-1255.

Carbon contents of 1.5 to 4.3%. Diagram, table. (M24, ST, CI)

61-M. The Electronic Structure of Some Body-Centred Cubic Metals. G. G. Hall. *Physical Society, Proceedings,* v. 66, no. 408A, Dec. 1953, p. 1162-1171.

Form of energy surfaces for both standard excited state and ground state deduced using transformation properties of a determinant wave function. Expressions thus found do not depend on any analytical approximation to wave functions nor on any arbitrary simplification of theory. Values for lithium and sodium found by fitting theoretical energies to energies calculated by other methods. Tables, diagram. 14 ref. (M25, Li, Na)

62-M. Is Proeutectoid Ferrite or Cementite Continuous With Pearlite Cementite? S. Modin. Henry Brutcher, Altadena, Cal., Translation no. 2810, 6 p. + 1 plate. (From *Jernkontorets Annaler,* v. 135, no. 4, 1951, p. 169-174.)

Previously abstracted from original. See item 299-M, 1951. (M26, ST)

63-M. Chemical Polishing of Iron and Soft Steel. L. Beaujard. Henry Brutcher, Altadena, Cal., Translation no. 3051, 3 p. + 1 plate. (From *Comptes rendus hebdom. des Séances de l'Académie des Sciences* (Paris) v. 234, 1952, p. 440-442.)

Previously abstracted from original. See item 121-M, 1952.
(M21, Fe, ST)

64-M. On the Structure of Spheroidal Graphite Cast Iron. A. Wittmoser. Henry Brutcher, Altadena, Cal., Translation no. 3069, 27 p. + 3 plates. (Condensed from *Giesserei,* nos. 6-8, 1952, p. 323-334.)

Difference in structure between spheroidal and lamellar graphite cast irons. Etch test for revealing primary structure and identification of inclusions developed by etches and characterized by "walls". Micrographs, tables. 36 ref.
(M27, M21, CI)

65-M. Development of Primary Structures of Welds in Low-Carbon and Low-Alloy Steels by Electrolytic Etching. A. A. Rossoshinskii. Henry Brutcher, Altadena, Cal., Translation no. 3071, 5 p. + 1 plate. (From *Avtomaticheskaya Svarka,* v. 6, no. 1, 1953, p. 52-54.)

Principle underlying development of primary structures by metallographic techniques. Shortcomings of deep etching and of multiple etching as applied to development of primary structure. Diagram, micrographs. 9 ref. (M21, K9, AY)

66-M. Mechanism of Etching of Metals by Ionic Bombardment. G. V. Spivak, I. N. Prilezhaeva, and O. I. Savochkina. Henry Brutcher, Altadena, Cal., Translation no. 3079, 8 p. + 1 plate. (From *Doklady Akademii Nauk SSSR,* v. 88, no. 3, 1953, p. 511-514.)

Studies of mechanism of cathodic atomization of metals in a gas discharge to develop their structure. Explanation of associated structural transformations on the basis of modern theory of formation of ionic and metallic crystals. Graph, micrographs. 15 ref. (M21, Al)

67-M. (German.) **The Tungsten Carbide-Titanium Carbide-Chromium Carbide System.** O. Rüdiger. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 967-969.

X-ray, metallographic and microhardness investigations. Table, graphs, micrographs.
(M24, W, Ti, Cr)

68-M. (Hungarian.) **A New Method for Polishing and Etching of Metallographic Specimens of Tungsten and Molybdenum.** Tivadar Millner and Lorant Sass. *Aluminium (Budapest),* v. 5, no. 10, Oct. 1953, p. 214-215.

Solution prepared for grain boundary etching. Micrographs. 3 ref.
(M21, W, Mo)

69-M. (Russian.) **Study of Ore Structures With Aid of Electron Microscope.** F. V. Syromiatnikov and A. F. Filimonov. *Izvestiia Akademii Nauk SSSR, Seriia Geologicheskaia,* 1953, no. 5, Sept.-Oct., p. 135-140.

Resolving power of 0.005 to 0.006 microns was sufficient for examination of clays, sooty ores, bauxites and manganese, iron and sulfide ores. Photographs, micrographs. 3 ref. (M21, M27, Fe, Mn)

70-M. Structure of Graphite Spherulites. M. N. Parthasarathi and B. R. Nijhawan. *Foundry Trade Journal,* v. 95, Dec. 31, 1953, p. 809-815.

Experimental data based on study of group of four nodules across its different parallel sections. Micrograph, table, photographs, diagrams. 7 ref. (M27, CI)

71-M. Structure of Some Iridium-Osmium Alloys. H. C. Vacher, C. J. Bechtoldt and E. Maxwell. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 80.

Techniques of crushing, polishing, and etching prior to X-ray diffraction and microscopic examination. Table, micrograph. 3 ref.
(M21, M27, Ir, Os)

72-M. The Gallium-Indium System. W. J. Svirbely and Sidney M. Selis. *Journal of Physical Chemistry,* v. 58, Jan. 1954, p. 33-35.

Specific resistance of solid and liquid gallium and indium and their alloys have been determined. From results of these resistance measurements, phase diagram for gallium-indium system has been redetermined. Graphs. 10 ref.
(M24, P15, Ga, In)

73-M. Simplified Autoradiography Exposure Calculation. William W. Wainwright, Ernest C. Anderson, Preston C. Hammer and Charles A. Lehman. *Nucleonics,* v. 12, Jan. 1954, p. 19-21.

Detail is improved by use of weak beta emitters. In isotope selection, charts are used to compare half-lives, emission energies, and to calculate exposure time. Photograph, autoradiographs, graph. 7 ref. (M23)

74-M. Analytical Aspects of X-Ray Diffraction. James I. Mueller. *Trend in Engineering, (University of Washington),* v. 6, Jan. 1954, p. 5-9, 28.

Applications in the fields of metallurgy; mining and prospecting; mineral preparation; and ceramics. Spectrographs, graphs, table, diagram. (M22)

75-M. (English.) **Ternary Alloys Formed by Aluminium, Transitional Metals and Divalent Metals.** G. V. Raynor, C. R. Faulkner, J. D. Noden and A. R. Harding. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 629-648.

Main features of equilibria in terms of free energies of phases present, and data, taken together with results of previous work. Graphs, diagrams, tables. 32 ref.
(M24, Al)

76-M. (English.) **Local Atomic Arrangements in Gold-Nickel Alloys.** P. A. Flinn, B. L. Averbach and Morris Cohen. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 665-673.

These alloys exhibit a preference for *unlike* neighbors above the solubility temperature and have short-range order analogous to that in copper-gold alloys. Diagrams, graphs, tables. 14 ref.
(M25, N10, Au, Ni)

77-M. (English.) **The Structure of Gamma-Manganese.** Z. S. Basinski and J. W. Christian. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 754-755.

Disputes that gamma-manganese has face-centered-tetragonal structure at all temperatures. 4 ref.
(M26, Mn)

78-M. (French.) **The Measuring of Lattice Distortions in Metal Single Crystals.** H. Lambot, L. Vassamillet and J. Dejace. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 711-719.

Use of a converging X-ray beam obtained by means of a curved quartz monochromator enables one to determine angular distortions of a crystal lattice. Single crystal to be studied is irradiated along one or two narrow bands, approximately 50 microns in width. Diagrams. 11 ref. (M26)

79-M. (French.) **X-Ray Investigation of the Development of a Polygonized State From a Slightly Deformed Copper-Zinc Solid Solution.** Adrienne R. Weill. *Comptes rendus,* v. 237, no. 23, Dec. 9, 1953, p. 1527-1529.

Study of X-ray diffraction diagrams of 35% zinc alloy confirms the polygonization mechanism. Micrographs. 2 ref. (M22, N12, Cu, Zn)

80-M. (French.) **An Example of the Transference of Metallographic Laws**

and Phenomena: From Light Aluminum Alloys to Heat-Resistant Austenitic Alloys. Albert Portevin. *Revue de Métallurgie,* v. 50, no. 12, Dec. 1953, p. 809-816.

Importance of applying knowledge gained in one field to problems of another. Application of phenomena, laws and results determined in study of light alloys to austenitic alloys. 17 ref. (M general, Al, SS)

81-M. (French.) Contribution to the Study of Diagrams Given by the Chevenard Micro-Tensile Testing Machine. H. Hendus, H. Röhrig and G. Kraus. *Revue de Métallurgie,* v. 50, no. 12, Dec. 1953, p. 844-846.

Formulas were derived for determining time elapsing between any two points of the diagram, rates of loading, elongation, and modulus of elasticity. Diagram, graphs. 2 ref. (M23, M24, Q27)

82-M. The Structure of Titanium-Silver Alloys in the Range 0-30 At.-% Silver. H. W. Worner. *Institute of Metals, Journal,* v. 82, Jan. 1954, p. 222-226 + 1 plate.

Metallographic and X-ray diffraction methods have been used to determine a partial phase diagram between 0 and 30 at. % silver, in temperature range 650-1100° C. Graphs, tables. 7 ref. (M24, Ti, Ag)

83-M. The Constitution of Alloys of Aluminium, Copper, and Iron. H. W. L. Phillips. *Institute of Metals, Journal,* v. 82, Jan. 1954, p. 197-212 + 2 plates.

Constitution of aluminum-rich alloys has been investigated over the range 0-40% copper, 0-3.5% iron by thermal analysis and microscopic examination, supplemented by measurements of liquid solubility. Graphs, tables. 21 ref. (M24, M23, M21, Al, Cu, Fe)

84-M. The Metallographic Detection of Gamma Phase in Beta-Brass. L. E. Samuels. *Institute of Metals, Journal,* v. 82, Jan. 1954, p. 227-228 + 1 plate.

Mechanical polishing was used to detect fine grain-boundary precipitates of gamma phase in a tin-containing beta-brass showing intercrystalline brittleness. 11 ref. (M21, Cu)

85-M. Take Guesswork Out of Grain Size Determinations. Richard F. Harvey. *Steel,* v. 134, Feb. 1, 1954, p. 108-109.

New technique which makes high speed toolsteel grain boundaries as clear as original hardened structure before tempering. Graph, micrographs. 2 ref. (M27, TS)

86-M. On the Solid Solutions of Metallic Compounds. I. I. Kornilov. Henry Brutcher, Altadena, Cal., Translation no. 2842, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 81, no. 4, 1951, p. 597-600.)

Previously abstracted from original. See item 138-M, 1952. (M26, Fe, Cr, V, Al, Ti, Zr, Cb, Ta)

87-M. Structure of Iron-Nickel-Aluminum Alloys for Permanent Magnets. Yu. Skakov. Henry Brutcher, Altadena, Cal., Translation no. 3052, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 79, no. 1, 1951, p. 77-80.)

Previously abstracted from the original. See item 49-M, 1952. (M26, Ni, SG-n)

88-M. (French.) Direct Examination of Metals by the Electron Microscope. Raymond Castaing and Paul Laborie. *Comptes rendus,* v. 237, no. 21, Nov. 23, 1953, p. 1330-1332.

Metal specimens were thinned by ionic bombardment and examined. Advantages of method. Micrographs. (M21)

89-M. (Book.) Dislocations in Crystals. W. T. Read, Jr. 228 p. 1953. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. $5.00.

Designed for use in industry and graduate school by those dealing with physical metallurgy and branches of solid-state physics. (M26)

90-M. (Book.) Procedures in Experimental Metallurgy. A. U. Seybolt and J. E. Burke. 340 p. 1953. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $7.00.

Most of the important laboratory techniques which are now used in preparation of metals and alloy specimens for further study. (M21, M22, M23)

N

Transformations and Resulting Structures

42-N. Isothermal Transformations in Cast Iron. J. Ings. *Australasian Engineer,* 1953, Nov., p. 62-67.

Problems in producing high-quality cast iron. Photographs, graphs. 10 ref. (N8, CI)

43-N. The Reaction of Nitrogen With, and the Diffusion of Nitrogen in, Beta Zirconium. M. W. Mallett, Jack Belle and B. B. Cleland. *Electrochemical Society, Journal,* v. 101, Jan. 1954, p. 1-5.

Rate of reaction of nitrogen with high-purity zirconium determined for temperature range of 975 to 1640° C. at 1 atmosphere pressure. Graphs, tables. 18 ref. (N1)

44-N. The Reaction of Silver Alloys With Sulfur in Mineral Oil. II. Examination of Reaction Films and Mechanism of Reaction. H. O. Spauschus, R. W. Hardt and R. T. Foley. *Electrochemical Society, Journal,* v. 101, Jan. 1954, p. 6-9.

Spectroscopic examination of films showed that sulfide films grown on silver alloys of cadmium, antimony, indium, thallium and zinc contained an appreciable quantity of the alloying element. Films grown on aluminum, magnesium and manganese alloys contained only a trace of the alloying element. Tables. 4 ref. (N12, S11, Ag)

45-N. The Copper-Silicon Eutectoid Transformation. A. D. Hopkins. *Institute of Metals, Journal,* v. 82, Dec. 1953, p. 163-165.

Hardness and metallographic studies made of the eutectoid transformation in a copper 5% with silicon alloy over the range 275-500° C. Graphs. 11 ref. (N9, Cu, Si)

46-N. Precipitation Processes in Copper-Iron Alloys. J. Reekie, T. S. Hutchison and F. E. Hetherington. *Physical Society, Proceedings,* v. 66, no. 408B, Dec. 1953, p. 1101-1112.

At high degrees of cold working dislocations are probably predominant factor in increasing resistance. Graphs, diagrams. 16 ref. (N7, Q24, Cu, Fe)

47-N. Gases in Metals. C. R. Cupp. Paper from "Progress in Metal Physics." v. IV. Interscience Publishers, Inc., p. 105-173 + 1 plate.

Solution and diffusion of gases in solid metals, with absorption, retention and evolution of gases by metals and with effects upon the properties of the solid metals. Tables, graphs, diagrams. 247 ref. (N1, Q general)

48-N. Diffusion in Metals. A. D. Le Claire. Paper from "Progress in Metal Physics." v. IV. Interscience Publishers, Inc., p. 265-332.

More important advances that have been made in understanding of diffusion processes. Diagrams, tables, graphs. 131 ref. (N1)

49-N. Nucleation. J. H. Hollomon and D. Turnbull. Paper from "Progress in Metal Physics." v. IV. Interscience Publishers, Inc., p. 333-388.

Nucleation in general with particular emphasis on rate of nucleation in reactions involving crystalline phases. Graphs, tables, diagrams. 92 ref. (N2)

50-N. Incubation Time of Austenite Transformation With Different Types of Cooling. F. Wever and O. Krisement. Henry Brutcher, Altadena, Cal., Translation no. 3039, 30 p. + 1 plate. (From *Archiv für das Eisenhüttenwesen,* v. 23, nos. 5-6, 1952, p. 229-237.)

Previously abstracted from original. See item 217-N, 1952. (N8, ST)

51-N. Effect of Foreign Nuclei Upon Crystallization of Metals and Alloys, Particularly the Formation of Eutectic in Gray Iron. VII. Nucleation and Growth of Spheroidal Graphite. W. Patterson. Henry Brutcher, Altadena, Cal., Translation no. 3091, 14 p. + 1 plate. (From *Giesserei, Technisch-Wissenschaftliche Beihefte,* 1952, nos. 6-8, p. 375-378.)

Lattice relationships between graphite and foreign nuclei present in cast iron as governing formation of spheroidal or flake graphite. Graphs, diagrams, micrographs. 3 ref. (N12, CI)

52-N. On Diffusion Fronts in Technical Iron. V. I. Arkharov, et al. Henry Brutcher, Altadena, Cal., Translation no. 3099, 6 p. + 1 plate. (From *Doklady Akademii Nauk SSSR,* v. 89, no. 2, 1953, p. 269-270.)

Shape of diffusion front in case of impregnation of technical iron with chromium and aluminum as against nickel, copper and palladium. Micrographs. 6 ref. (N1, Fe, Cr, Al, Ni, Cu, Pd)

53-N. Phase and Structural Transformations in Steel After Repeated Recrystallization. D. S. Kazarnovskii. Henry Brutcher, Altadena, Cal., Translation no. 3101, 9 p. + 1 plate. (From *Doklady Akademii Nauk SSSR,* v. 87, new ser., no. 3, Nov. 21, 1952, p. 409-413.)

Previously abstracted from original. See item 207-N, 1953. (N5, M27, C, CN)

54-N. Reactions Between Solid Iron and Liquid Aluminum and Aluminum Alloys. E. Gebhardt and W. Obrowski. Henry Brutcher, Altadena, Cal., Translation no. 3149, 19 p. + 1 plate. (From *Zeitschrift für Metallkunde,* v. 44, no. 4, Apr. 1953, p. 154-160.)

Previously abstracted from original. See item 170-N, 1953. (N12, Fe, Al)

55-N. (German.) Vaporization of Metals and Metalloids in Vacuum. H. Laporte. *Chemische Technik,* v. 5, no. 11, Nov. 1953, p. 632-634.

General principles and rules for industrial vacuum vaporization. Small laboratory vacuum vaporization plant described. Tables. 4 ref. (N16, L25)

56-N. (German.) The Course of Segregation of Copper-Beryllium at High Temperature. W. Gruhl. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 978-982.

Resistance measurements, X-ray studies and metallographic investigations of segregation of beryllium from supersaturated solid copper-beryllium solutions at 500-750° C. Graphs, X-ray diagrams, tables, photomicrographs. 14 ref. (N12, Cu, Be)

57-N. (German.) Research on the Solubility of Titanium in Magnesium. H. Eisenreich. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 1003-1006.

Experiments of dissolving titanium in magnesium by adding titanium

tetrachloride to the melt and of casting into sand and chill molds. Graphs, tables, photomicrographs. 5 ref. (N12, Ti, Mg)

58-N. (Russian.) **Determining the Bonding Energy in the Austenite Lattice.** Iu. V. Kornev. *Doklady Akademii Nauk SSSR,* v. 93, no. 3, Nov. 21, 1953, p. 467-470.

Conclusion that addition of carbon to iron noticeably decreases energy of the bond of the austenite lattice. Table, diagram, graph. 8 ref. (N8, Fe)

59-N. Diffusion of Nitrogen in Iron. J. D. Fast and M. B. Verrijp. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 24-27.

Determination of the diffusion coefficient of nitrogen at 950° C. shows that diffusion in gamma-iron is much slower than in alpha-iron. Graphs, tables. 16 ref. (N1, Fe)

60-N. Magnetic Transformation of Iron in Copper Matrix at Low Temperatures. R. E. Cech and D. Turnbull. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 45-46.

Phenomenon initiated by subcooling below room temperature. Table. 5 ref. (N6, Fe, Cu)

61-N. Solidification of Aluminum-Rich Aluminum-Copper Alloys. Arthur B. Michael and Michael B. Bever. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 47-56.

Investigation of different solidification rates. Graphs, tables, micrographs. 21 ref. (N12, Al, Cu)

62-N. Reaction of Oxygen and Nitrogen With Titanium From 700° to 1050° C. Lee S. Richardson and Nicholas J. Grant. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 69-70.

Experimental results of studies in reaction rates. Graphs. 5 ref. (N general, Ti)

63-N. An Application of the Absolute Rate Theory to Phase Changes in Solids. F. W. Cagle, Jr., and Henry Eyring. *Journal of Physical Chemistry,* v. 57, Dec. 1953, p. 942-946.

Theoretical analysis. Results are applied to white to gray transition in tin. Graphs. 2 ref. (N6, Sn)

64-N. A Thermal Gradient Method for the Study of Crystal Structure and Its Application to Order-Disorder Research. John B. Newkirk. *Review of Scientific Instruments,* v. 24, Dec. 1953, p. 1116-1121.

New method has been developed for studying effect of temperature on crystal structure of metals and alloys. Micrographs, diagrams, photograph. (N10, M26)

65-N. Transformation of Cr-Mo Steels During Welding. W. R. Apblett, Jr., R. P. Dunphy and W. S. Pellini. *Welding Journal,* v. 33, Jan. 1954, p. 57S-64S.

Experimental procedures and results using two chromium-molybdenum steels. Table, diagrams, graphs, micrographs. (N8, K general, AY)

66-N. (English.) **The Isothermal Transformation of Metastable Beta-Uranium Single Crystals.** A. N. Holden. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 617-623.

Individual uranium martensite plates formed and grew at a slow rate isothermally. Diagrams, micrographs. 8 ref. (N6, U)

67-N. (English.) **The Influence of Oxygen Contents on Transformations in a Titanium Alloy Containing 11 Per Cent Molybdenum.** D. J. Delazaro and W. Rostoker. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 674-678.

Presence of oxygen was correlated with occurrence of subgrain-boundary structures and abnormal variations in precipitation rates from grain to grain. Micrographs, graphs. 5 ref. (N7, Ti)

68-N. (English.) **The Kinetics of Precipitation of Barium Sulfate From Aqueous Solution.** D. Turnbull. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 685-691.

Rate of linear growth of barium sulfate crystals is independent of their size and apparently limited by a process occurring at the crystal-solution interface. Graphs, tables. 15 ref. (N12)

69-N. (English.) **Ternary Laves and Sigma-Phases of Transition Metals.** Kehsin Kuo. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 720-724.

Formation of substitutional phases and intermetallic compounds by metals which adjoin each other in periodic system. Tables. 24 ref. (N6)

70-N. (English.) **Order-Disorder in Cu-Au Alloys. I. Short-Range Order in an Alloy Containing 23 Atomic Per Cent Au.** C. H. Sutcliffe and F. E. Jaumot, Jr. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 725-730.

Measurements of diffuse background intensity were made throughout the reciprocal lattice unit cell and analyzed by means of a three-dimensional Fourier analysis. Short-range order parameters are given for the first ten shells surrounding a given atom for three temperatures above the critical temperature. Tables, diagram, graph. 7 ref. (N10, Cu, Au)

71-N. (English.) **On the Nuclear Magnetic Resonance in Metals and Alloys.** N. Bloembergen and T. J. Rowland. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 731-746.

Effects are explained in terms of quadrupole interaction and can give information about state of order or disorder on an atomic scale in the alloy. Graphs, tables, oscillograms. 36 ref. (N10, Sn, Tl, Pb, Na, Mg, In, Hg, Bi, Cu)

72-N. (English.) **Notes on Geisler's Theory of Phase Transformations, With Special Reference to Indium-Thallium Alloys.** Z. S. Basinski and J. W. Christian. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 759-761.

Existence of macroscopic surface tilts is evidence that the characteristic of martensitic reactions is the growth *mechanism* and not the energetics of growth. 8 ref. (N9)

73-N. (English.) **Comment on Paper by Tiller, Jackson, Rutter and Chalmers.** P. Pfann. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 763-764.

Indicates the nature of the equations which govern segregation reactions in the intermediate range, where mixing in liquid is incomplete but nevertheless greater than attained by diffusion alone. 5 ref. (N12)

74-N. (English.) **Nuclear Composition—a Factor of Interest in Nucleation.** Mats Hillert. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 764-766.

Effects of composition of grain nuclei on formation of precipitates. Diagrams. 5 ref. (N2)

75-N. (French.) **On the Introduction of Carbon^{14} Into Pure Iron by Gaseous Cementation.** Philippe Albert. *Revue de métallurgie,* v. 50, no. 12, Dec. 1953, p. 829-831; disc., p. 831-832.

A method which gives good results. Carburization was carried out by means of acetylene prepared from barium carbide containing carbon^{14}. Diagrams, table. (N1, Fe)

76-N. (French.) **The Isothermal Transformation of Austenite and the Distribution of Alloying Elements in Low-Alloy Steels.** Axel Hultgren, et al. *Revue de métallurgie,* v. 50, no. 12, Dec. 1953, p. 847-867.

Various types of transformation have been distinguished and their kinetics determined. Tables, graphs, micrographs. 23 ref. (N8, AY)

77-N. (Russian.) **Influence of Internal Grain Structure of Austenite on the Self Diffusion of Iron.** P. L. Gruzin, E. V. Kuznetsov and G. V. Kurdiumov. *Doklady Akademii Nauk SSSR,* v. 93, no. 6, Dec. 21, 1953, p. 1021-1023.

Effect of internal grain structure in investigating diffusion mechanism in alloys where there are phase transformations. Graph. 6 ref. (N1, N6, Fe)

78-N. (Russian.) **The Electric Resistance of Ni$_3$Fe Alloys Which Contain Molybdenum.** B. G. Livshits and M. P. Ravdel. *Doklady Akademii Nauk SSSR,* v. 93, no. 6, Dec. 21, 1953, p. 1033-1035.

Shows that decreased ordering occurs continually with increased molybdenum content. Graphs. 11 ref. (N10, P15, Ni, Fe, Mo)

79-N. The Use of Carbon Crucibles in Measurements on the Rate of Evaporation of Liquid Metals in a Vacuum. M. G. Rossmann and J. Yarwood. *British Journal of Applied Physics,* v. 5, Jan. 1954, p. 7-13.

Conditions necessary to obtain measurements on evaporation of metals which liquefy at elevated temperatures in a vacuum. Tables, diagram. 8 ref. (N16)

80-N. Diffusion of Elements in Liquid Iron. B. V. Stark, E. V. Chelishchev, and E. A. Kazachkov. Henry Brutcher, Altadena, Cal., Translation no. 2840, 7 p. + 2 plates. (From *Izvestiya Akademii Nauk SSSR, OTN,* 1951, no. 11, p. 1689-1695.)

Previously abstracted from the original. See item 161-N, 1952. (N1, Fe)

81-N. Transformation of Austenite Into Martensite at Subzero Temperature. II. V. G. Vorob'ev and A. P. Gulyaev. Henry Brutcher, Altadena, Cal., Translation no. 3021, 8 p. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 21, no. 10, 1951, p. 1164-1169.)

Previously abstracted from the original. See item 194-N, 1953. (N8, ST)

82-N. Nitriding of Iron. I. R. Krichevskii and N. E. Khazanova. Henry Brutcher, Altadena, Cal., Translation no. 3028, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 71, no. 3, 1950, p. 481-484.)

Previously abstracted from the original. See item 144-N, 1950. (N8, J28, Fe)

83-N. On the Migration of Austenite Grain Boundaries. M. G. Lozinskii. Henry Brutcher, Altadena, Cal., Translation no. 3044, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 82, no. 1, 1952, p. 53-56.)

Previously abstracted from the original. See item 132-N, 1952. (N3, ST)

84-N. Contribution to the Problem of the Austenite-Martensite Transformation. G. A. Oding. Henry Brutcher, Altadena, Cal., Translation no. 3046, 6 p. (From *Vestnik Mashinostroeniya,* v. 32, no. 3, 1952, p. 69-71.)

A study of martensite transformation over entire temperature range of this transformation at a cooling rate not in excess of 5° F. per min. based on dilatometric method. Table, graphs. 3 ref. (N8, AY)

85-N. (Book.) **1953 Supplement to the Atlas of Isothermal Transformation Diagrams.** 529 p. 1953. United States Steel Corp., Pittsburgh, Pa.

Supplement to 1951 Edition. Contains more than 400 diagrams. References to original sources are given. (N8, ST, CI)

P

Physical Properties and Test Methods

79-P. Metal-Ceramic Interactions: III. Surface Tension and Wettability of Metal-Ceramic Systems. Michael Humenik, Jr., and William D. Kingery. *American Ceramic Society, Journal,* v. 37, Jan. 1954, p. 18-23.

Method using precise sessile-drop method. Diagrams, photograph, graphs, tables. 6 ref. (P10)

80-P. The Melting Point of Titanium. T. H. Schofield and A. E. Bacon. *Institute of Metals, Journal,* v. 82, Dec. 1953, p. 167-169.

Melting point of titanium has been redetermined using a technique which reduces possibility of contamination by refractories. Tables. 10 ref. (P12, Ti)

81-P. The Density of Molten Iron. V. H. Stott and J. H. Rendall. *Iron and Steel Institute, Journal,* v. 175, Dec. 1953, p. 375-378.

Two closely agreeing measurements of density of molten iron (averaging 7.00 g. per cc. at 1564° C.) have been made by filling in *vacuo* a pyknometer made of alumina and determining mass of iron contained in it. Diagram. 14 ref. (P10)

82-P. A Graphite Tube Resistance Furnace and Voltage Regulator for Equilibrium Studies in the Temperature Range 1500-1800° C. W. E. Dennis, F. D. Richardson and J. H. Westcott. *Journal of Scientific Instruments,* v. 30, Dec. 1953, p. 453-455.

Design and performance characteristics. Diagrams, graph. 3 ref. (P12, M23)

83-P. The Study of Surface Reactions With the Aid of Large Metal Crystals. Allan T. Gwathmey. *Record of Chemical Progress,* v. 14, no. 3, 1953, p. 116-129.

Single crystal method of studying surface reactions, emphasizing importance of crystal face. Different faces of crystal often behave as if they were different metals. Diagrams, photographs, table. 14 ref. (P10)

84-P. (English.) **Alloys With a Fixed Rate of Dilatation.** *Aciers Fins & Spéciaux Francais,* 1953, no. 13, Mar., p. 82-85.

Physical properties of iron-nickel, iron-chromium and iron-nickel-cobalt alloys. Tables, graph. (P11, Fe, Cr, Ni, Co)

85-P. (French.) **Some Compounds of Cobalt and Iron With Very Weak and Constant Paramagnetism.** A. Serres. *Journal de physique et le radium,* v. 14, no. 12, Dec. 1953, p. 689-690.

Magnetization coefficients of several lanthanum alloys with iron and cobalt measured. Tables. 7 ref. (P16, Co, Fe)

86-P. (German.) **An Amplitude and Temperature-Dependent Hysteresis of Alpha Iron at −70°C.** Günther Sorger. *Zeitschrift für angewandte Physik,* v. 5, no. 11, Nov. 1953, p. 406-413.

Experimental and theoretical studies made to explain hysteresis losses in an iron-silicon alloy with decreasing temperature. Table, graphs. 8 ref. (P16, Fe, Si)

87-P. (German.) **The Electrical Properties of Thin Vapor-Deposited Silver Films at 3000 Megacycles.** Friedrich J. Tischer. *Zeitschrift für angewandte Physik,* v. 5, no. 11, Nov. 1953, p. 413-415.

Theoretical investigation of wave expansion through silver films. Depth of penetration, reflexion and transmission factors. Graphs, table. (P15, Ag)

88-P. (Hungarian.) **Application of Thermodynamic Functions to Metallurgy.** Aurel Horvath. *Kohaszati Lapok,* v. 8, no. 12, Dec. 1953, p. 245-258.

First law of thermodynamics, molecular-kinetic and thermodynamic explanation of heat capacity, law of equipartition of energy and characteristics related to heat capacity of substances in different states of aggregation. Graphs, tables. (To be continued.) (P12)

89-P. (Russian.) **Influence of Plastic Deformation on the Form of the Curve of Iron and Nickel Magnetization in the Area of High Magnetic Fields.** V. V. Parfenov. *Doklady Akademii Nauk SSSR,* v. 93, no. 3, Nov. 21, 1953, p. 435-438.

Influence of torsion and elongation on magnetization in a magnetic field of up to 10000 oersteds. Graphs. 11 ref. (P16, Q24, Fe, Ni)

90-P. (Russian.) **Change of Magnetic Properties of Magnets Which Are Under Large Compression Stresses.** M. A. Grabovskii and E. I. Parkhomenko. *Izvestiia Akademii Nauk SSSR, Seriia Geofizicheskaia,* 1953, no. 5, p. 405-417.

Magnetite specimens subjected to uniaxial compression. Results. Graphs, diagram. 17 ref. (P16)

91-P. (Russian.) **Determination of the Direction of Magnetization of Disturbed Bodies According to the Results of Magnetic Survey.** D. S. Mikov. *Izvestiia Akademii Nauk SSSR, Seriia Geofizicheskaia,* 1953, no. 5, p. 418-423.

Method expounded for two-dimensional bodies. Importance for interpretation of magnetic survey data. Graph, table. (P16)

92-P. (Russian.) **Chemistry of Metal Alloys.** I. I. Kornilov. *Priroda,* v. 42, no. 10, Oct. 1953, p. 16-23.

Importance of Mendeleev periodic chart in predetermining nature of interaction between metals and metalloids. Tables, graphs, micrographs. (P13)

93-P. Activity Coefficients of Oxygen and Phosphorus in Iron-Oxygen-Phosphorus Melts. J. Pearson and E. T. Turkdogan. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 19-23.

Molten Fe-O-P alloys have been equilibrated at temperatures between 1572 and 1624° C. with hydrogen-water-vapor mixtures of known composition. Tables, graphs, diagram. 23 ref. (P12, Fe)

94-P. A Thermodynamic Study of the Iron, Cobalt, and Nickel Sulphides. Terkel Rosenqvist. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 37-57; disc. p. 57-58.

Results are discussed with emphasis on their connection with structure of different phases and nature of interatomic binding forces. Graphs, tables, diagram. 40 ref. (P12, M25, Fe, Co, Ni)

95-P. A Radio-Frequency Permeameter. Peter H. Haas. *Journal of Research, National Bureau of Standards,* v. 51, Nov. 1953, p. 221-228.

An instrument is described which is capable of measuring permeability and losses in ferromagnetic toroidal cores. Diagrams. 5 ref. (P16)

96-P. Surface Brightness of Sheet Aluminium. J. F. G. Hérenguel. *Metal Treatment and Drop Forging,* v. 21, Jan. 1954, p. 25-28, 48.

Survey and appraisal of various techniques. Diagram, tables, graphs, photographs. (P17, Al)

97-P. Volatile Platinum Oxide and Silicide. R. E. Carter and F. D. Richardson. *Research (Supplement),* v. 7, Jan. 1954, p. 3-5.

Results of experimental studies on loss of platinum from thermocouples. Graphs. 3 ref. (P15, Pt)

98-P. (English.) **The Influence of Cold Work and Radiation Damage on the Debye Temperature of Copper.** D. Bowen and G. W. Rodeback. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 649-653.

Simultaneous measurements of resistance were made on a damaged wire and a well-annealed wire. Differing behavior of temperature-dependent portions of resistivities has been interpreted as a decrease of Debye temperature in the damaged sample. Graphs, diagram. 7 ref. (P15, Cu)

99-P. (English.) **Heat Capacity and Resistance Measurements for Aluminum and Lead Wires.** T. E. Pochapsky. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 747-751.

Both heat capacities and temperature coefficients of resistance increase with temperature in such a way as to suggest that they are influenced by a single activated process rather than by impurities. Graphs, tables. 11 ref. (P11, Al, Pb)

100-P. (English.) **Thermodynamics of Surface Adsorption.** J. W. Stout. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 753-754.

Disputes Spretnak and Speiser's surface adsorption equation. 3 ref. (P10, P12)

101-P (English.) **Magnetic and Crystallographic Studies on the Higher Antimonies of Iron, Cobalt and Nickel.** Terkel Rosenqvist. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 761-763.

Small deviations between observed and theoretical magnetic moments and between observed and calculated values for the Sb-Sb distance are regarded as a result of a transition toward metallic binding, whereby some of the valency electrons are promoted to an electron gas or conduction band. Graphs, tables. 4 ref. (P16, M26, Fe, Co, Ni, Sb)

102-P. (German.) **Development and Status of Soft-Magnetic Materials.** Hermann Fahlenbrach and Walter Heister. *Stahl und Eisen,* v. 73, no. 25, Dec. 3, 1953, p. 1644-1652.

A literature review. Effects of composition, purity, and field strength on magnetic properties of metals and oxides. Graphs, diagrams. 81 ref. (P16, SG-p)

103-P. (Polish.) **Production of Silicon Sheets of High Initial Permeability.** M. Markuszewicz and A. Zawada. *Prace Instytutow Ministerstwa Hutnictwa,* v. 5, no. 5, Sept.-Oct. 1953, p. 259-276.

Properties of silicon sheets for use in telecommunication systems. Effect of metallurgical and structural factors on magnetic permeability in low fields. Tables, graphs, micrographs, diagram. 17 ref. (P16, Si, ST)

104-P. (Polish.) **Apparatus for Determination of Magnetic Anisotropy.** L. Kozlowski, M. Poziomska and E. Romer. *Prace Instytutow Ministerstwa Hutnictwa,* v. 5, no. 5, Sept.-Oct. 1953, p. 277-284.

Operating principles of apparatus designed to establish torque diagrams and texture of disks of cold rolled silicon strips. Graphs, tables, photographs, diagrams. 16 ref. (P16, AY)

105-P. (Russian.) **Criteria of Similarity of Phenomena of the Surface Effect in Ferromagnetic Bodies.** I. M.

Kirko. *Doklady Akademii Nauk SSSR*, v. 93, no. 6, Dec. 21, 1953, p. 1029-1031.
Effects of weak and strong fields on magnetic permeability. Graphs. 9 ref. (P16)

106-P. Effects of Band Shape on the Magnetic and Thermal Properties of Metals and Alloys. E. W. Elcock, P. Rhodes, and A. Teviotdale. *Royal Society, Proceedings*, v. 221, ser. A, Jan. 7, 1954, p. 53-77.
Temperature variations of electronic contributions to paramagnetic susceptibility and specific heat of metals calculated for various forms of electron energy bands. Results are applied to experimental data for palladium and palladium-silver alloys. Graphs, diagrams. 19 ref. (P16, P12, M25, Pd, Ag)

107-P. Rate of Reduction of Iron Oxides. E. P. Tatievskaya, G. I. Chufarov and V. K. Antonov. Henry Brutcher, Altadena, Cal., Translation no. 3074, 9 p. (Condensed from *Zhurnal Fizicheskoi Khimii*, v. 24, no. 4, 1950, p. 385-393.)
Investigation into variation in equilibrium pressure of oxygen during dissociation of Fe_2O_3, Fe_3O_4, and FeO. Tables, graphs, 4 ref. (P12, Fe)

108-P. Magnesium-Cadmium Alloys. V. Low Temperature Heat Capacities and a Test of the Third Law of Thermodynamics for the MgCd Suuperlattice. C. B. Satterthwaite, R. S. Craig and W. E. Wallace. **VI. Heat Capacities Between 12 and 320° K. and the Entropies at 25° of Magnesium and Cadmium.** R. S. Craig, C. A. Krier, L. W. Coffer, E. A. Bates and W. E. Wallace. **VII. Low Temperature Heat Capacities of $MgCd_3$ and Mg_3Cd and a Test of the Third Law of Thermodynamics for the $MgCd_3$ Superlattice.** L. W. Coffer, R. S. Craig, C. A. Krier and W. E. Wallace. *American Chemical Society, Journal*, v. 76, Jan. 5, 1954, p. 232-244.
Apparatus, techniques and results. Diagrams, tables. 38 ref. (P12, Mg, Cd)

109-P. Effect of Temperature on Iron Powder Cores. George Katz. *Electrical Manufacturing*, v. 53, Feb. 1954, p. 135-137.
Heat tests on two types of high-frequency cores show changes in Q that may affect performance where close tolerances are required. Photograph, graphs, table. (P15, H11, Fe)

110-P. Thermal Diffusivity of Metals at High Temperatures. P. H. Sidles and G. C. Danielson. *Journal of Applied Physics*, v. 25, 1954, p. 58-66.
Modified Angström method for measuring thermal diffusivity and hence thermal conductivity of metals has been developed. Photographs, diagrams, graphs. 13 ref. (P11)

111-P. A Method of Measuring Magnetostriction. A. W. Cochardt. *Journal of Applied Physics*, v. 25, Jan. 1954, p. 91-95.
Values derived from torsion tests made on wires of various ferromagnetic materials. Graphs, diagram, table. 11 ref. (P16, Fe, Ni, Co, Al, Cr)

112-P. Some Magnetostriction Relations in Materials Possessing Preferred Domain Orientations. George T. Rado. *Journal of Applied Physics*, v. 25, Jan. 1954, p. 102-106.
Relations between magnetostrictive strains derived for polycrystalline ferromagnetic materials. Tables, diagram. 9 ref. (P16, Ni, Fe, Co, Al)

113-P. Some Properties of Sodium and Potassium Near Their Melting Points. L. G. Carpenter. *Journal of Chemical Physics*, v. 21, Dec. 1953, p. 2244-2245.
Examines common model for resistance, diffusion and specific heat phenomena. Graphs. 8 ref. (P12, Na, K)

114-P. Life of Silver-Surfaced Contacts on Repetitive Arcing Duty. W. R. Wilson. *Power Apparatus and Systems*, 1953, no. 9, Dec., p. 1236-1243; disc., p. 1243.
An investigation of the breakdown point of silver under varied conditions. Photographs, tables, diagrams, graphs. 5 ref. (P15, S21, Ag)

115-P. Electronic Eigenvalues of Copper. D. J. Howarth. *Royal Society, Proceedings*, v. 220, ser. A, Dec. 22, 1953, p. 513-529.
Electronic wave functions and eigen values at points of high symmetry in Brillouin zones of metallic copper. Tables, graphs, diagrams. 20 ref. (P15, Cu)

Q
Mechanical Properties and Test Methods; Deformation

137-Q. A Method of Making Edgewise Bend Tests of Rectangular Bus Bar. C. O. Smith and F. M. Howell. *ASTM Bulletin*, 1953, no. 194, p. 58-61.
Apparatus and techniques. Diagram, tables, photograph. (Q5)

138-Q. Fatigue Properties of Cast Iron. G. N. J. Gilbert. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Dec. 1953, p. 94-108.
General discussion including Orowan's theory of fatigue. Graphs, diagrams, tables. 12 ref. (Q7, CI)

139-Q. Comprehensive Mechanical Tests on an Acicular Cast Iron. K. B. Palmer. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Dec. 1953, p. 109-117 + 1 plate.
Results of tests on typical 30-ton tensile acicular cast iron carried out on reasonably uniform test pieces. Tables, graphs, micrographs. (Q general, CI)

140-Q. Galvanizing Embrittlement of Blackheart Malleable Iron. G. N. J. Gilbert. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Dec. 1953, p. 124-131 + 2 plates.
Effects of phosphorus and silicon on susceptibility to embrittlement. Quenching from 650° C. prevents embrittlement. Micrographs, drawing, graphs, tables. 5 ref. (Q23, L16, CI)

141-Q. The Problem of Hydrogen Diffusion in the Pickling of Spring Steel. J. S. Jackson. *Electrodepositors' Technical Society, Journal*, v. 28, 1951-1952, p. 89-98; disc., p. 98-101 + 2 plates.
It has been found that whereas hydrogen embrittlement only causes a slight reduction in fatigue limit, in cases of higher stress ranges results are very seriously lowered, especially in the case of hardened and tempered springs. Graphs, tables, diagram. 12 ref. (Q23, Q7, L12, CN)

142-Q. The Plastic Design of Grillages. Jacques Heyman. *Engineering*, v. 176, Dec. 25, 1953, p. 804-807.
Theoretical and experimental work in plastic behavior of grillages. Tables, photographs, diagrams, graphs. (Q23)

143-Q. The Low-Stress Torsional Creep Properties of Pure Aluminium. W. Betteridge. *Institute of Metals, Journal*, v. 82, Dec. 1953, p. 149-161.
Creep properties of pure aluminum at 200° C. determined by a high-sensitivity torsion method, at a torque producing a maximum elastic shear strain of $2{\cdot}8 \times 10^{-5}$. Creep strain shown to be primarily dependent on amount of cold work applied to material and on time and temperature of annealing treatments given before the creep test. Tables, graphs, diagram. 21 ref. (Q3, Al)

144-Q. The Effects of Some Constitutional Factors on the Creep and Fatigue Properties of Lead and Lead Alloys. L. M. T. Hopkin and C. J. Thwaites. *Institute of Metals, Journal*, v. 82, Dec. 1953, p. 181-196 + 7 plates.
Tin, copper and antimony were added to high-purity lead. Fine grains and presence of dispersed phases increased creep resistance. Fatigue resistance was increased more in single-phase alloys than in two-phase systems. Aging effects studied. Graphs, tables. 53 ref. (Q3, Q7, Pb)

145-Q. Fracture of Alpha Iron. Constance F. Tipper and E. O. Hall. *Iron & Steel*, v. 26, Dec. 11, 1953, p. 594-597; disc., p. 659-662.
Abridged from paper presented at Iron and Steel Institute, Autumn General Meeting, 1953. Investigation to determine amount of plastic deformation involved in fracture of crystals when such fracture was of cleavage type. Diagrams, graphs, table, micrographs. (Q24, Q26, Fe)

146-Q. Iron-Oxygen Alloys. W. P. Rees and B. E. Hopkins. *Iron & Steel*, v. 26, Dec. 11, 1953, p. 597-600; disc., p. 659-662.
Abridged from paper presented at Iron and Steel Institute, Autumn General Meeting, 1953. Tensile and V-notched Charpy impact tests over temperature range covering tough to brittle transition. Table, micrographs. (Q6, Q27, Fe)

147-Q. Propagation of Brittle Fracture in Steel. T. S. Robertson. *Iron and Steel Institute, Journal*, v. 175, Dec. 1953, p. 361-374 + 4 plates.
Development of a new test which applies a known transverse stress and assesses material through its ability to arrest a running crack. Diagrams, graphs, tables. (Q26, Q23, ST)

148-Q. Internal Friction of Molybdenum During Tensile Deformation. R. E. Maringer. *Journal of Applied Physics*, v. 24, Dec. 1953, p. 1525.
Results of experimental study. Graph. (Q22, Mo)

149-Q. Mechanical Properties of Zirconium. *Light Metal Age*, v. 11, Dec. 1953, p. 16-18.
Results of tests. Annealing, deforming, welding and casting of unalloyed zirconium. Tables. (Q general, Zr)

150-Q. Thick Cylinders. W. A. Milnes. *Mechanical World and Engineering Record*, v. 133, Dec. 1953, p. 540-543.
Complement to traditional method of establishing basic Lamé equations for radial and hoop stresses in thick cylinders subjected to heavy hydrostatic pressure. Applications to derivation of practical formulas for wall thickness and design stress recommendations. Diagrams. (Q25)

151-Q. Research Progress. Kink Bands. *Metal Industry*, v. 83, Dec. 11, 1953, p. 481.
Slip and deformation of face-centered cubic metal crystals. 3 ref. (Q24, Al, Cu)

152-Q. Intercrystalline Brittleness. A. R. Bailey, S. Morris, and A. J. K. Wiesiolek. *Metal Industry*, v. 83, Dec. 18, 1953, p. 497-498.
Investigates delayed intercrystalline failure under sustained tensile stress, in air, of sand-cast, ternary beta brass containing about 4% aluminum. Table. 8 ref. (Q23, Cu)

153-Q. A Note on the Preparation of Miniature Tensile Test Specimens. R. J. M. Payne. *Metallurgia,* v. 48, no. 290, Dec. 1953, p. 315.

Method of sampling large components in order to investigate local properties. Diagram. (Q27)

154-Q. Influence of Microstructure on the Hot Strength of Steel. Georges Delbart and Michel Ravery. *Metal Treatment and Drop Forging,* v. 20, Dec. 1953, p. 579-589.

Creep tests were carried out at 450 and 575° C. Influence of preliminary heating and soaking investigated. Tables, graphs, micrographs. 5 ref. (Q3, M27, AY)

155-Q. Stress-Strain Records at High Straining Rates. Francis G. Tatnall and Greer Ellis. *Nondestructive Testing,* v. 11, Nov.-Dec. 1953, p. 32-34.

Trials of suggested instrumentation for recording X-Y load-deformation curves of structural parts and components subjected to pulses, shocks, impacts, vibrations and alternating loads at frequencies encountered in service. Diagrams, photographs, oscillograms. (Q27)

156-Q. Plastic Deformation and the Electric Strength of Alkali Halide Crystals. R. Cooper and A. A. Wallace. *Physical Society, Proceedings,* v. 66, no. 408B, Dec. 1953, p. 1113-1115.

Photo-elastic method used to detect birefringence due to plastic deformation. Apparatus illustrated. Micrographs, diagram. 4 ref. (Q24, Q25)

157-Q. Electrolytic Cold-Working and Internal Friction in Palladium-Hydrogen Alloys. F. A. Lewis, G. E. Roberts and A. R. Ubbelohde. *Royal Society, Proceedings,* v. 220, ser. A, Dec. 8, 1953, p. 279-289.

Effects of hydrogen on elastic moduli of palladium are only small. Graphs, photograph, diagrams. 18 ref. (Q22, Pb)

158-Q. Internal Friction in Metals. A. S. Nowick. Paper from "Progress in Metal Physics". v. IV. Interscience Publishers, Inc., p. 1-70.

Attempt to provide a phenomenological description of general features of nonelastic deformation which is sufficiently general to include anelasticity, static hysteresis and amplitude dependent internal friction. Graphs, diagrams. 149 ref. (Q22)

159-Q. Theory of Dislocations. A. H. Cottrell. Paper from "Progress in Metal Physics". v. IV. Interscience Publishers, Inc., p. 205-264 + 2 plates.

Review of progress. Diagrams, graphs. 160 ref. (Q24, M26)

160-Q. The Statistical Behavior of Fatigue Properties and the Influence of Metallurgical Factors. E. Epremian and R. F. Mehl. Paper from "Symposium on Fatigue With Emphasis on Statistical Approach". II. ASTM Special Technical Publication no. 137. American Society for Testing Materials, p. 25-54; disc., p. 55-57.

Includes tables, graphs, diagrams. 23 ref. (Q7)

161-Q. A Statistical Interpretation of the Effect of Understressing on Fatigue Strength. E. Epremian and R. F. Mehl. Paper from "Symposium on Fatigue with Emphasis on Statistical Approach". II. ASTM Special Technical Publication no. 137. American Society for Testing Materials, p. 58-64; disc., p. 65-69.

Investigation to study understressing effect from a statistical viewpoint. Tables, graphs. (Q7)

162-Q. Fatigue Properties of Large Specimens With Related Size and Statistical Effects. Oscar J. Horger and Harry R. Neifert. Paper from "Symposium on Fatigue with Emphasis on Statistical Approach". II. ASTM Special Technical Publication no. 137. American Society for Testing Materials, p. 70-89; disc., p. 90-91.

Results of rotating-bending fatigue tests on shafts 0.3 to 6 in. in diameter from ASE plain carbon steels of 0.39 and 0.54% carbon content in both the as-forge and normalized-and-tempered conditions. Shafts were tested with stress concentration, as represented by both fillets and press-fitted members, as well as plain specimens. Diagrams, micrographs, tables, photograph. 14 ref. (Q7, ST)

163-Q. Mechanism of Action of Inhibitors Upon Hydrogen Embrittlement of Steel in Sulfuric Acid. Z. A. Iofa and E. I. Liakhovetskaia. Henry Brutcher, Altadena, Cal., Translation no. 3048, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 86, no. 3, 1952, p. 577-580.)

Previously abstracted from original. See item 92-Q, 1954. (Q23, Q5, CN)

164-Q. (English.) **Auto-Stresses in Steel Parts.** *Aciers Fins & Spéciaux Francais,* 1953, no. 15, Nov., p. 32-36.

Production, measurement, effects, stress relief and suppression of auto-stresses. 4 ref. (Q25, ST)

165-Q. (French.) **The Effect of Low Temperatures on Plasticity of Steels Used in Metallic Constructions.** A. Chagneau. *Ossature metallique,* v. 18, no. 11, Nov. 1953, p. 577-580.

Changes in mechanical properties of metals and alloys in tension, drop, fatigue, hardness and impact tests. Outlines MacAdam theory to explain influence of low temperatures. Graphs. (Q general, ST)

166-Q. (French.) **Definition of Fatigue Resistance in the Case of Steel-Welded Structures.** *Soudure et Techniques connexes,* v. 7, nos. 11-12, Nov.-Dec. 1953, p. 282-284.

Results of tests conducted by the International Welding Institute's Fatigue Testing Commission no. 13. Photographs. (Q7, K9, ST)

167-Q. (German.) **Hardness Testing of Cast-Copper Alloys. I.** P. Melchior. **II.** H. Meichsner. *Metall,* v. 7, nos. 11-12, June 1953, p. 433-436; nos. 23-24, Dec. 1953, p. 1007-1009.

Part I: Three seconds are adequate for loading interval in Brinell hardness test. Part II: Experimental data showing that proposed reduction of impression time is neither necessary nor desirable. Tables, graphs, micrographs. (Q29, Cu)

168-Q. (German.) **Symposium on Brittle Fracture in Leoben.** O. Werner. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 901-905.

Phenomena, mechanism, causes and structural processes of brittle fracture. Methods of testing. 11 ref. (Q26, Q23)

169-Q. (German.) **Explanation of the Supporting Effect in Alternating Stress.** H. O. Meuth. *Metall,* v. 7, nos. 23-24, Dec. 1953, p. 974-977.

Effect of a notch on alternating and statistically stressed materials. Diagrams, graphs. 24 ref. (Q25)

170-Q. (German.) **Formation of Slip Lines on Plastically Deformed Metal Surfaces. II-III.** W. Späth. *Metalloberfläche,* Ausgabe A, v. 7, no. 12, Dec. 1953, p. 177-183.

Literature review on slip lines and bands. Mechanism of slipping was shown to generate ultrasound waves. Effect of temperature on slip band width. Correlation between slip band width and ultrasonic frequencies of different metals. Diagrams, tables. 34 ref. (Q24)

171-Q. (German.) **X-Ray Investigation on the Internal Stresses in Plastically Elongated Iron.** Eugen Kappler and Ludwig Reimer. *Zeitschrift für angewandte Physik,* v. 5, no. 11, Nov. 1953, p. 401-406.

Grunough's theory expanded by applying obliquely incident X-rays. Results confirm theory. Stress-lattice constant diagrams explain high internal stresses of iron. Graphs. 14 ref. (Q25, Fe)

172-Q. (Russian.) **Questions of Conformity in Relaxation and Speed Characteristics During Plastic Extension.** L. I. Vasil'ev. *Doklady Akademii Nauk SSSR,* v. 92, no. 2, Sept. 11, 1953, p. 301-302.

New data correlates theory and experimental results using specimens of tin, copper, nickel and copper-nickel wire. (Q23, Sn, Cu, Ni)

173-Q. (Russian.) **Wear Resistance of Diffusion Chromium Plated Carbon Steel in the Presence of Certain Liquid Media.** M. M. Khrushchov, M. A. Babichev and G. N. Dubinin. *Doklady Akademii Nauk SSSR,* v. 92, no. 2, Sept. 11, 1953, p. 303-306.

Investigations made in 5% K_2CrO_4 solution in distilled water. Wear resistance is not determined by hardness of steel. Tables, graphs. 4 ref. (Q9, CN, Cr)

174-Q. (Russian.) **Plastic Deformation and Fracture During Torsion.** F. P. Rybalko. *Doklady Akademii Nauk SSSR,* v. 93, no. 3, Nov. 21, 1953, p. 471-473.

Investigations devoted to study of the connection between plasticity of metals and appearance of macro-evidence of deformation. Graph. 7 ref. (Q24, Q1)

175-Q. (Russian.) **Mechanical Properties of Basic Open Hearth Carbon Steel.** S. L. Levin, S. N. Mylko and I. P. Kazachkov. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 1-4.

Factors influencing formation of hot cracks in castings. Techniques of melting and effect of carbon content and pouring temperature. Tables, graphs. 6 ref. (Q general, D2, CI)

176-Q. (Russian.) **Durability of High Phosphorus Perlitic Cast Iron.** V. B. Liadskii. *Liteinoe Proizvodstvo,* 1953, no. 8, Aug., p. 16-17.

Results of laboratory wear tests. Sliding and rolling friction resistance determined. Tables, diagrams. 9 ref. (Q9, CI)

177-Q. (Russian.) **Complex Stress Functions in the Axisymmetrical Contact Problem in the Elasticity Theory.** N. A. Rostovtsev. *Prikladnaia Matematika i Mekhanika,* v. 17, no. 5, Sept.-Oct. 1953, p. 611-614.

Method of calculation of stress and displacement fields in absence of friction and adhesive forces. 4 ref. (Q21)

178-Q. (Russian.) **Calculation of the Profile of a Rotating Disk for Creep Conditions.** A. G. Kostiuk. *Prikladnaia Matematika i Mekhanika,* v. 17, no. 5, Sept.-Oct. 1953, p. 615-618.

Considers thin disk with stationary creep conditions. 3 ref. (Q3)

179-Q. (Swedish.) **Impact Transition Temperatures and Aging Properties of Titanium Stabilized Mild Steels.** Ake Josefsson and Bengt Nelson. *Jernkontorets Annaler,* v. 137, no. 10, 1953, p. 725-743.

Influence of fixing carbon and nitrogen as soluble titanium carbides and nitrides on transition temperature in the Charpy test. Graphs, micrographs, tables. 13 ref. (Q6, N7, ST, Ti)

180-Q. The Statistical Nature of the Fatigue Properties of SAE 4340 Steel Forgings. J. T. Ransom and R. F. Mehl. Paper from "Symposium on Fatigue with Emphasis on Statistical Approach". II. ASTM Special Technical Publication no. 137. American Society for Testing Materials, p. 3-21; disc., p. 21-24.

High and low-quality forgings of same tensile strength level studied. Specimens taken in longitudinal and transverse directions. Procedures used to permit statistical analysis of variability of endurance limit and life to failure. Tables, diagrams, graphs. 15 ref. (Q7, ST)

181-Q. Steel Testing and Design. III. W. A. Martin. *Canadian Metals,* v. 17, Jan. 1954, p. 34-35.

Testing and design procedures with sound engineering bases are necessary to reduce ignorance factors in design and to assist in avoiding material failures under service conditions. Low-alloy high-tensile steels are discussed. 3 ref. (Q general, AY)

182-Q. Effect of Plastic Deformation on Carbide Precipitation in Steels. D. V. Wilson. *Iron and Steel Institute, Journal,* v. 176, Jan. 1954, p. 28.

Tests show that carbide precipitation is strongly retarded by plastic deformation in medium carbon steels. Micrographs. 4 ref. (Q24, N8, ST)

183-Q. Tin Increases Strength of Ti-Al Alloys Without Loss in Fabricability. W. L. Finlay, R. I. Jaffee, R. W. Parcel and R. C. Durstein. *Journal of Metals,* v. 6, Jan. 1954, p. 25-29.

Experimental data show 5% aluminum, 2.5% tin alloy is markedly superior to interstitial alpha-type alloys. Graphs, tables. 5 ref. (Q general, Ti, Al, Sn)

184-Q. Effect of Repeated Tensile Prestrain on the Ductility of Some Metals. Edmund C. Franz. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 56-57.

Techniques and results of experiments using aluminum alloy and electrolytic copper. Graphs, micrograph. 4 ref. (Q23, Al, Cu)

185-Q. Mechanism of Plastic Flow in Titanium: Manifestations and Dynamics of Glide. F. D. Rosi. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 58-69.

Slip and twinning behavior in extended titanium crystals are studied in some detail. Formation and appearance of coarse kink bands. Diagrams, micrographs, table. 29 ref. (Q24, Ti)

186-Q. Creep Correlations of Metals at Elevated Temperatures. Oleg D. Sherby, Raymond L. Orr and John E. Dorn. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Jan. 1954, p. 71-80.

Application of correlations to data for aluminum, iron, nickel, copper, zinc, platinum, gold, lead, and simple alloys. Graphs, tables. 22 ref. (Q3, Al, Fe, Ni, Cu, Zn, Pt, Au, Pb)

187-Q. On the Axisymmetric Problem of Elasticity Theory for a Medium With Transverse Isotropy. R. A. Eubanks and E. Sternberg. *Journal of Rational Mechanics and Analysis,* v. 3, Jan. 1954, p. 89-101.

Mathematical discussion. 12 ref. (Q21)

188-Q. Cantilever Beams. B. Saelman. *Machine Design,* v. 26, Jan. 1954, p. 161-163.

Method of calculating tearout strength. Diagrams, graphs. (Q23)

189-Q. Properties of Cast Stainless Steels. *Materials & Methods,* v. 39, Jan. 1954, p. 129, 131, 133.

Data sheet. (Q general, SS)

190-Q. Brittle Failure of Nonship Steel-Plate Structures. M. E. Shank. *Mechanical Engineering,* v. 76, Jan. 1954, p. 23-28.

Summary of report to the Committee on Ship Structural Design, National Academy of Science—National Research Council. A survey of nonship brittle failures of carbon plate steel structure to determine factors relating to such failures. Photographs. (Q23)

191-Q. Viscous Flow at Grain Boundaries? *Metal Industry,* v. 84, Jan. 8, 1954, p. 30.

Theories of mechanism of creep in a polycrystalline metal. 1 ref. (Q3, Al)

192-Q. Comparative Fatigue Tests With 24S-T Alclad Riveted and Bonded Stiffened Panels. J. H. Rondeel, R. Kruithof and F. J. Plantema. *Netherlands Nationaal Luchtvaartlaboratorium Report* S. 416, Dec. 1952, p. S1-S14.

Compares fatigue strengths of bonded and riveted flat sheet-stringer panels of identical construction except for the sheet-stringer joints. Results of fatigue tests on panels stiffened with angle section stringers and top-hat stringers. Graphs, diagrams, tables, photographs. (Q7, K13, Al)

193-Q. Note on the General Stress-Strain Relations of Some Ideal Bodies Showing the Phenomena of Creep and of Relaxation. J. P. Benthem. *Netherlands Nationaal Luchtvaartlaboratorium Report* S. 426, p. S15-S23.

General stress-strain relations of isotropic linear bodies and viscosity phenomena which may accompany plastic deformation. Diagrams. 7 ref. (Q23, Q24, Q3)

194-Q. Deformation in Copper and Alpha Brasses. A. M. Halstead, J. M. McCaughey and H. Markus. *Product Engineering,* v. 25, Jan. 1954, p. 180-185.

Clarification of true nature of stress-strain relationship and cause of initial deformation. Tables, photographs, graphs. 9 ref. (Q27)

195-Q. Lower and Upper Bounds to the Ultimate Loads of Buckled Redundant Trusses. E. F. Masur. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 385-392.

Two theorems are derived establishing lower and upper bounds to ultimate loads. 8 ref. (Q28)

196-Q. On Saint-Venant's Principle. E. Sternberg. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 393-402.

Mathematical discussion of principle which involves the problem of extension, torsion, and flexure of prismatic and cylindrical bodies. 18 ref. (Q27, Q1)

197-Q. Plastic Flow in a Deeply Notched Bar With Semi-Circular Root. Alexander J. Wang. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 427-438.

Unsteady motion problem of a circular-notched bar pulled in tension in plane strain. Graphs. 7 ref. (Q24)

198-Q. On Some Eigenvalue Problems of Exceptional Difficulty, Exemplified by a Case of Elastic Instability. R. V. Southwell and Gillian Vaisey. *Quarterly Journal of Mechanics and Applied Mathematics,* v. 6, Dec. 1953, p. 453-480.

Relaxation methods to estimate critical load and mode of distortion ("waving") for a flat plate representative of a cantilever I-beam. Diagrams, graphs, tables. 14 ref. (Q21)

199-Q. Closure Waves in Helical Compression Springs With Inelastic Coil Impact. J. A. Morrison. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 457-471.

Problem of spring surges taking into account coil closure is mathematically discussed. Drawings. 1 ref. (Q28)

200-Q. The Torsion and Stretching of Spiral Rods. II. H. Okubo. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 488-495.

A mathematical analysis. Graphs. (Q1)

201-Q. An Addition to Poritsky's Solutions of a Differential Equation of Torsion. J. C. Wilhoit, Jr. *Quarterly of Applied Mathematics,* v. 11, Jan. 1954, p. 499-501.

Mathematical solutions. 1 ref. (Q1)

202-Q. Problems of Hardness Testing of Thin Sheet Metals. E. Börje Bergsman. *Sheet Metal Industries,* v. 31, no. 321, Jan. 1954, p. 5-14.

Micro-hardness and problems arising from testing sheet and foil. Graphs, photomicrographs, table. 37 ref. (Q29)

203-Q. Hardness Testing Equipment and Methods. John E. Hyler. *Tooling and Production,* v. 19, Dec. 1953, p. 64, 75, 78, 104-108.

Includes photographs. (Q29)

204-Q. Fatigue Tests at Stresses Producing Failure in 2 to 10,000 Cycles. 24S-T3 and 75S-T6 Aluminum-Alloy Sheet Specimens With a Theoretical Stress-Concentration Factor of 4.0 Subjected to Completely Reversed Axial Load. Herbert F. Hardrath and Walter Illg. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3132, Jan. 1954, 14 p.

Notched specimens were subjected to completely reversed axial loads. Failures occurred in less than 50 cycles at two-thirds of static tensile strength and in as few as two cycles when applied load was near the static strength of the specimen. Graphs, tables, photograph. 7 ref. (Q7)

205-Q. Ductility Transition of Weld Metal. W. S. Pellini and E. W. Eschbacher. *Welding Journal,* v. 33, Jan. 1954, p. 16S-20S.

Determination by drop weight test method. Relative resistance to fracture initiation of weld metal and structural steels. Photographs, diagrams, tables, graphs. 4 ref. (Q23, ST)

206-Q. Fatigue Strength of Butt Joints in ⅜-in. Thick Aluminum Alloy Plates. E. C. Hartmann, Marshall Holt and I. D. Eaton. *Welding Journal,* v. 33, Jan. 1954, p. 21S-30S.

Results of direct-stress fatigue tests. Tables, diagrams, photographs, graphs. 8 ref. (Q7, Al)

207-Q. The Plastic Fatigue Strength of Pressure Vessel Steels. J. H. Gross, D. E. Gucer and R. D. Stout. *Welding Journal,* v. 33, Jan. 1954, p. 31S-39S.

Strain behavior, surface preparation, testing temperature, welding, and heat treatments. Diagrams, photographs, graphs, tables. 2 ref. (Q7, CN, AY)

208-Q. (English.) Some Plastic Properties of Nickel Alloys. V. F. Zackay and T. H. Hazlett. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 624-628.

Data on nickel-iron alloys show that iron effectively solution-hardens nickel. Tables, graphs. 5 ref. (Q23, N7, Fe, Ni)

209-Q. (English.) Tensile Deformation of High-Purity Copper as a Function of Temperature, Strain Rate, and Grain Size. R. P. Carreker, Jr., and W. R. Hibbard, Jr. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 654-655, 657-663.

Effect of rate was investigated by rate-change tests over the same ranges of temperature and grain size. Graphs, tables, diagram. 21 ref. (Q27, Cu)

210-Q. (English.) Cleavage Deformation in Zinc and Sodium Chloride. P. L. Pratt. *Acta Metallurgica,* v. 1, no. 6, Nov. 1953, p. 692-699.

Flat surfaces prepared by cleavage of single crystals show deforma-

tion markings associated with propagation of the cleavage crack. Micrographs, diagrams. 11 ref. (Q24, Zn)

211-Q. (English.) **Deformation Mechanisms in Titanium at Elevated Temperatures.** C. J. McHargue and J. P. Hammond. *Acta Metallurgica*, v. 1, no. 6, Nov. 1953, p. 700-701, 703-705.
Study of coarse-grained specimens deformed in tension at 815° C. Diagrams, micrographs, table. 9 ref. (Q27, Ti)

212-Q. (English.) **The Dynamic Yielding of Mild Steel.** J. D. Campbell. *Acta Metallurgica*, v. 1, no. 6, Nov. 1953, p. 706-710.
Results of dynamic and impact tests on mild steel. A criterion for dynamic yield is proposed. Graphs. 15 ref. (Q27, Q6, CN)

213-Q. (English.) **The Nucleation Problem in Deformation Twinning.** R. L. Bell and R. W. Cahn. *Acta Metallurgica*, v. 1, no. 6, Nov. 1953, p. 752-753.
Discusses three characteristics in twinning; creation of wedge-shaped twin, spread of twin across crystal, and thickening of twin lamella. 9 ref. (Q24, Zn)

214-Q. (English.) **Strain Markings in Alpha-Brass.** J. J. Gilman. *Acta Metallurgica*, v. 1, no. 6, Nov. 1953, p. 764.
Accounts for appearance of strain markings upon etching. 2 ref. (Q24, Cu)

215-Q. (French.) **Effect of Rate of Deformation and Temperature on the Work Hardening of Armco Iron.** H. Hendus and H. Röhrig. *Revue de métallurgie*, v. 50, no. 12, Dec. 1953, p. 833-838; disc., p. 838.
Microtensile tests were carried out at various temperatures between 20 and 100° C. Graphs. 11 ref. (Q27, Fe)

216-Q. (French.) **Effect of Aging at 80° C. on Mechanical Properties of Armco Iron and a 0.16% Carbon Steel.** H. Hendus and H. Röhrig. *Revue de métallurgie*, v. 50, no. 12, Dec. 1953, p. 839-843.
Effect of aging on hardness, elastic limit, tensile strength, and workhardening. Graphs. 12 ref. (Q general, N7, AY)

217-Q. (German.) **Hot Work Toolsteels.** Hermann M. Hiller. *Stahl und Eisen*, v. 73, no. 24, Nov. 19, 1953, p. 1565-1574.
Required properties of toolsteels and methods of determining these properties. Effects of different alloying elements and application of heat resistant toolsteels. Table, graphs. 29 ref. (Q general, T6, TS)

218-Q. (German.) **Experiments on the Development of a Wear Resistant Medium-Hard Cast Iron Roll With Spheroidal Cast Iron.** Wilhelm Schlüter. *Stahl und Eisen*, v. 73, no. 24, Nov. 19, 1953, p. 1605-1607.
Structure and mechanical properties due to spheroidal graphite in cast iron. Tables, graph, diagrams. (Q general, CI)

219-Q. (German.) **High-Strength Weldable Heavy Structural Steel With Aluminum and Titanium Additions.** Roland Mitsche and Alois Legat. *Stahl und Eisen*, v. 73, no. 25, Dec. 3, 1953, p. 1652-1654.
Laboratory and plant experience has shown that low-alloy manganese steels were greatly improved in strength. Graphs, tables. 20 ref. (Q23, AY)

220-Q. (Polish.) **X-Ray Investigations of Low-Carbon Steel Textures.** Z. Bojarski. *Prace Instytutow Ministerstwa Hutnictwa*, v. 5, no. 5, Sept.-Oct. 1953, p. 285-290.
Literature review on textures produced by rolling and recrystallization of iron and low-carbon steel. Tables, photograph, X-ray diffraction patterns. 22 ref. (Q24, CN, Fe)

221-Q. (Russian.) **Certain Characteristics of Variable Rate of Plastic Elongation.** L. I. Vasil'ev and L. I. Eremina. *Doklady Akademii Nauk SSSR*, v. 93, no. 6, Dec. 21, 1953, p. 1019-1020.
Compares results of experiments using aluminum specimens with previous tests using copper and tin. Graph. 3 ref. (Q24, Sn, Al, Cu)

222-Q. (Russian.) **Determining the Coefficient of Diffusion During Plastic Deformation.** S. I. Gubkin and S. A. Dovnar. *Doklady Akademii Nauk SSSR*, v. 93, no. 6, Dec. 21, 1953, p. 1025-1027.
Method does not require vacuum installations and is simpler than others. Data are precise and easily processed. Diagrams. (Q24, Ni)

223-Q. Plastic Theory for a Trussed Steel Beam With a Central Load. R. W. Steed. *Engineering*, v. 177, Jan. 15, 1954, p. 77-78.
Basic principles of plastic theory for specialized structures. (Q23, ST)

224-Q. The Behaviour of Thick-Walled Cylinders Under Very High Pressures. L. Deffet and J. Gelbgras. *Engineers' Digest*, v. 15, Jan. 1954, p. 17-19. (Translated from *Revue Universelle des Mines*, ser. 9, v. 9, no. 10, Oct. 1953, p. 725-740.)
Previously abstracted from original. See item 10-Q, 1954. (Q25, CN)

225-Q. On the Effect of Pretwisting on Bending. Francis D. Murnaghan. *National Academy of Sciences of the United States of America, Proceedings*, v. 39, Dec. 1953, p. 1218-1220.
In a solid circular beam, to obtain the sum of the deflections due to torsion and bending separately, there must be superimposed on the twisting and bending moments a transverse loading. (Q5, Q1)

226-Q. The Effect of Static and Dynamic Loading and Temperature on the Yield Stress of Iron and Mild Steel in Compression. J. M. Krafft, A. M. Sullivan and C. F. Tipper. *Royal Society, Proceedings*, v. 221, ser. A, Jan. 7, 1954, p. 114-127 + 2 plates.
Cylindrical test samples were compressed statically and dynamically at temperatures ranging from +100° to −195° C. Yield stress, form of yield and surface markings were observed. Diagrams, micrographs, graphs. 8 ref. (Q28, Fe, CN)

227-Q. The Propagation of Electrons in a Strained Metallic Lattice. S. C. Hunter and F. R. N. Nabarro. *Royal Society, Proceedings*, v. 220, ser. A, Dec. 22, 1953, p. 542-561.
Propagation of electrons in a strained metallic medium studied by a technique in which perturbing potenial is proportional to elastic strain. Electrical resistivity caused by dislocations is calculated for copper and sodium. Graph. 17 ref. (Q25, P15, Cu, Na)

228-Q. Elastic Buckling Under Combined Stresses of Flat Plates With Integral Waffle-Like Stiffening. Norris F. Dow, L. Ross Levin and John L. Troutman. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3059, Jan. 1954, 19 p.
Theory and experiment compared and found in good agreement. Graphs, photographs, table, diagram. 13 ref. (Q28, Al)

229-Q. Data on the Compressive Strength of Skin-Stringer Panels of Various Materials. Norris F. Dow, William A. Hickman and B. Walter Rosen. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3064, Jan. 1954, 49 p.
Flat skin-stringer compression panels of stainless steel, mild steel, titanium, copper, four aluminium alloys and a magnesium alloy were tested. Graphs, photograph, diagram, tables. 19 ref. (Q28, SS, ST, Ti, Cu, Al, Mg)

230-Q. Creep Bending and Buckling of Linearly Viscoelastic Columns. Joseph Kempner. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3136, Jan. 1954, 22 p.
General dynamic equation of creep bending of a beam loaded laterally and axially derived for a linearly visco-elastic material whose mechanical properties can be characterized by four parameters. Graphs, diagrams. 10 ref. (Q3, Q28)

231-Q. Creep Bending and Buckling of Nonlinearly Viscoelastic Columns. Joseph Kempner. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3137, Jan. 1954, 27 p.
Differential equations of bending of an idealized H-section beam column derived for a nonlinearly viscoelastic material whose mechanical properties are analogous to a model consisting of a linear spring in series with a nonlinear dashpot whose strain rate is proportional to a power of the applied stress. Graphs, diagrams, tables. 11 ref. (Q3, Q28)

232-Q. Creep Buckling of Columns. Joseph Kempner and Sharad A. Patel. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3138, Jan. 1954, 24 p.
Formulas for determination of creep deflection-time characteristics of an initially curved idealized H-section column. Graphs, diagrams, tables. 5 ref. (Q28, Q3)

233-Q. Time-Dependent Buckling of a Uniformly Heated Column. Nathan Ness. *U. S. National Advisory Committee for Aeronautics, Technical Note*, 3139, Jan. 1954, 18 p.
Theoretical investigation of time-temperature-dependent buckling of a pin-jointed constant-section column whose initial curvature is defined by a half-sine wave when material is linearly visco-elastic and is heated uniformly along the column at a prescribed time rate. Graph, diagram. 9 ref. (Q28)

234-Q. "Grass Roots" of Stress Control. Joseph Holt. *Welding Engineer*, v. 39, Feb. 1954, p. 50-53.
Importance of thorough understanding of stress control, shrinkage and distortion to avoid residual stress and gain greater strength and longer life for our ships and weldments. Photographs. (Q25, K general)

235-Q. Procedure for Determining the Hardness Variation Pattern of Alpha and Gamma Phases in Steel Being Heated in Vacuo to 2000° F. M. G. Lozinskii. Henry Brutcher, Altadena, Cal., Translation no. 3045, 7 p. (From *Doklady Akademii Nauk SSSR*, v. 84, no. 1, 1952, p. 63-66.)
Previously abstracted from the original. See item 726-Q, 1952. (Q29, CN)

236-Q. Abrasive Wear of Metals at Various Temperatures and Speeds. G. I. Kiselev. Henry Brutcher, Altadena, Cal., Translation no. 3062, 6 p. (From *Doklady Akademii Nauk SSSR*, v. 87, no. 5, 1952, p. 735-737.)
Previously abstracted from original. See item 778-Q, 1953. (Q9, CN, Cu, Zn)

237-Q. (French.) **Definition of Fatigue Strength in Welded Steel Structures.** *Revue de la Soudure (Brussels)*, v. 9, no. 4, 1953, p. 184-186.
Criterion of fatigue strength adopted by International Institute of Welding for steels is maximum load the material will withstand for two million cycles. Photographs. (Q7, ST)

238-Q. (French.) **Some Experimental Data Concerning the Schnadt Resili-**

ence Tests. R. Vancrombrugge. *Revue de la Soudure (Brussels),* v. 9, no. 4, 1953, p. 207-213.

Results of tests depending on gradient of stress, velocity of deformation and nature of stress. Photographs, tables, graphs. (Q25, K9)

239-Q. An Investigation Into the Plastic Bending of Aluminium Alloy Beams. J. B. Dwight. Aluminium Development Association, Research Report no. 16, 1953, 68 p.

Investigations into flexural behavior of aluminum beams, with the object of providing information for any subsequent development of a plastic design method for aluminum structures. Diagrams, graphs, photographs, tables. 20 ref. (Q23, Al)

240-Q. (Photocopy.) **A Study of Creep of Titanium and Two of Its Alloys.** PB112228. Univ. of Michigan for U. S. Air Force. 26 p. Sept. 1951. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00. Photostat $3.75.

On basis of data obtained by reheating at 210, 400, and 600° F., for various lengths of time, conclusions are reached on creep rates, hardness values, and yield strengths in relation to the time at recovery temperature. All tests are explained and illustrated in graphical forms. (Q3, Ti)

241-Q. (Book.) **ASME Handbook. Metals Engineering—Design.** Oscar J. Horger, Ed. 405 p. 1953. McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y. $10.00.

A summary of important reference data and essential properties to be considered in design. (Q general)

242-Q. (Book.) **Applied Elasticity.** Chi-Teh Wang. 357 p. 1953. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. $8.00.

Chapters on analysis of stress and strain; stress-strain relations and the general equations of elasticity; plane-stress and plane-strain problems; torsion of various shaped bars; finite-difference approximations and the relaxation method; energy principles and variational methods; solution by means of complex variables; bending and compression of bars; numerical method in determination of buckling loads; bending and buckling of thin plates; and theory of thin shells and curved plates. (Q21)

243-Q. (Book.) **Design in Structural Steel.** John E. Lothers. 454 p. Prentice-Hall, 70 Fifth Ave., New York 11. $10.00

Makes use of latest building and bridge specifications, and demonstrates most recent methods of analysis and design. (Q25, T26, ST)

244-Q. (Book.) **Formulas for Stress and Strain.** Raymond J. Roark. 3rd Ed. 381 p. 1954. McGraw-Hill Book Co., 330 W. 42nd St., New York 36.

Intended primarily as a reference book. A compact summary of the formulas, facts, and principles pertaining to strength of materials. (Q23)

R

Corrosion

52-R. Corrosive Effects of De-Icing Salts. Progress Report of NACE Technical Practices Committee 19 on Corrosion by De-Icing Salts. *Corrosion,* v. 10, Jan. 1954, p. 3-6.

De-icing salt used in cities in Northern part of the United States is estimated to cause an added $100,000,000 annual loss to automobiles and buried pipes and cables. Methods of testing effect of salts on steel. Suggests mitigation practices. 21 ref. (R6)

53-R. Corrosion by Acids at High Temperatures. R. F. Miller, R. S. Treseder and A. Wachter. *Corrosion,* v. 10, Jan. 1954, p. 7-12; disc., p. 12.

Simple test method for obtaining corrosion data with acids and other corrosives at temperatures above their normal boiling points. Diagrams, tables, graphs. 4 ref. (R5)

54-R. Corrosion Testing by Measurement of Local Cell Potentials. J. K. Rice. *Corrosion,* v. 10, Jan. 1954, p. 25-29; disc., p. 29.

Method of measurement which uses rotating electrode and stationary microprobe reference electrode. Diagrams, graphs, photographs. 4 ref. (R11)

55-R. Titanium Progress Report. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 46, Jan. 1954, p. 103A-105A.

Developments needed for extensive use in chemical process industries. Table. (R general, Ti)

56-R. Corrosion Resistance of Galvanized-Steel-Stitched Aluminum Alloys. *Light Metal Age,* v. 11, Dec. 1953, p. 28.

National Bureau of Standards investigation of corrosion resistance of sheets of unclad and aluminum clad 24S-T3 aluminum alloy stapled together with galvanized steel wire. (R general, Al)

57-R. Boiler Plate Embrittlement. Sydney D. Scorer. *Mechanical World and Engineering Record,* v. 133, Dec. 1953, p. 558-559.

Caustic cracking. (R1)

58-R. Boiler Feed Water Treatment for Advanced Steaming Conditions. J. Leicester. *Overseas Engineer,* v. 27, Jan. 1954, p. 206-211.

Research into factors leading to boiler corrosion and deposits. Recommendations for feed water conditioning. Diagrams, graphs. 8 ref. (R1, R4)

59-R. Five Steps to Lower Corrosion Costs. V. B. Guthrie. *Petroleum Processing,* v. 9, Jan. 1954, p. 72-74.

Includes diagram. (R general)

60-R. Chemicals Commonly Used in Internal Boiler Water Treatment. Richard B. Conlan. *Plant,* v. 9, Jan. 1954, p. 50-53.

Chemicals for preventing scale, adjusting pH and removing dissolved oxygen completely to prevent pitting. Photographs, tables. (R4, R10)

61-R. Machine Tool Corrosion by Soluble Cutting Oils. I. *Product Finishing,* v. 6, Dec. 1953, p. 82-86.

Practical determination of extent of corrosion with a series of commercial soluble oils. Photographs, tables. 3 ref. (R7, G21, TS)

62-R. The Status of Fretting Corrosion. II. Mechanism Identification and Prevention of Fretting. W. E. Campbell. *Scientific Lubrication,* v. 5, Dec. 1953, p. 18-22.

Classification of wear corrosion phenomena and prevention. Photograph. 19 ref. (R1)

63-R. Corrosive Action of Dissolved Gases on Steel in Water. J. Wade Watkins and Jack Wright. Paper from "General Papers Presented Before the Division of Petroleum Chemistry". American Chemical Society, Div. of Petroleum Chemistry, p. 5-13.

Evaluates comparative efficiencies of different methods used to condition and inject water, from the standpoint of minimizing corrosion and preventing plugging of producing formation of water-input wells, and to investigate possibility of improving existing methods or of devising new ones. Diagram, graph, photograph. 8 ref. (R9, R4, ST)

64-R. The Mechanism of Oxidation of Metals and Alloys at High Temperatures. Karl Hauffe. Paper from "Progress in Metal Physics". v. IV. Interscience Publishers, Inc., p. 71-104.

New theoretical viewpoints on formation of scale on various metals. (R2)

65-R. The Current Status of Fretting Corrosion. W. E. Campbell. Paper from "Symposium on Fretting Corrosion". ASTM Special Technical Publication no. 144. American Society for Testing Materials, p. 3-19; disc., p. 19-23 + 1 plate.

Fretting wear of metal surfaces. Methods of mitigating fretting. Suggestions for future research on the mechanism. Graph, micrographs, table. 46 ref. (R1)

66-R. Fretting Corrosion Tendencies of Several Combinations of Materials. J. R. McDowell. Paper from "Symposium on Fretting Corrosion". ASTM Special Technical Publication no. 144. American Society for Testing Materials, p. 24-39; disc., p. 82.

Combinations of materials, both metallic and nonmetallic, were subjected to conditions producing fretting corrosion in a effort to evaluate their comparative susceptibility to this action. Table listing results in three groups of relative resistance. Tables, photographs, diagram. 9 ref. (R1)

67-R. Influence of Fretting Corrosion on the Fatigue Strength of Fitted Members. Oscar J. Horger. Paper from "Symposium on Fretting Corrosion". ASTM Special Technical Publication no. 144. American Society for Testing Materials, p. 40-51; disc., p. 52-53.

Fundamental nature of the fatigue problem associated with fretting. Eight factors separately treated as to how each influences fatigue strength regarding both the initiation and propagation of fatigue cracks. Photographs, graphs, tables. 24 ref. (R1, Q7)

68-R. Effect of Lubricants in Minimizing Fretting Corrosion. E. W. Herbek, Jr., and R. F. Strohecker. Paper from "Symposium on Fretting Corrosion". ASTM Special Technical Publication no. 144. American Society for Testing Materials, p. 54-66; disc., p. 67-70.

Survey of past work on the effect of lubricants in minimizing fretting corrosion. Investigators differ on corrective effect of specific lubricants. Tables, photograph. 20 ref. (R1)

69-R. Test Equipment for Evaluating Fretting Corrosion. H. H. Uhlig, W. D. Tierney and A. McClellan. Paper from "Symposium on Fretting Corrosion". ASTM Special Technical Publication no. 144. American Society for Testing Materials, p. 71-78; disc., p. 79-81.

Test machine designed and constructed to measure fretting corrosion quantitatively under precisely defined conditions. Photographs, graphs, diagram. 11 ref. (R1, R11)

70-R. Corrosion Behavior of Stainless Steels in Oxidizing Solutions. Corrosion in Chromic Acid Solutions. M. M. Kurtepov, G. V. Akimov and N. N. Bardizh. Henry Brutcher, Altadena, Cal., Translation no. 3054, 4 p. (From *Doklady Akademii Nauk SSSR,* v. 87, no. 4, 1952, p. 625-626.)

Effect of steel composition, concentration of acid and temperature of solution. Tables. 1 ref. (R5, SS)

71-R. Study of Process of Oxidation (Rusting) of Iron by Isotope Method. E. I. Dontsova. Henry Brutcher, Altadena, Cal., Translation no. 3073. 7 p. (From *Doklady Akademii Nauk SSSR,* v. 85, no. 1, 1952, p. 165-167.)

Distribution of oxygen isotopes between water and oxidation products. Results of computations and their verification by experiment. Tables. 7 ref. (R11, Fe)

72-R. (English.) **Stainless Steels of Austeno-Ferritic Structure.** *Aciers Fins & Spéciaux Francais,* 1953, no. 13, Mar., p. 65-69.

Corrosion resistance and mechanical properties. Photographs, tables. (R general, Q general, SS)

73-R. (French.) **General Survey of the Electrochemical Behavior of Metals. II.** Marcel Pourbaix. *Ossature metallique,* v. 18, no. 11, Nov. 1953, p. 581-590.

Polarization curves and behavior of iron in presence of aqueous solutions, in contact with a metal more noble than iron and in contact with a metal less noble than iron. Diagrams, tables, graphs. 17 ref. (R1, Fe, Pt, Zn, Cu)

74-R. (German.) **Atmospheric Rust Prevention. The Importance of Surface Pre-Treatment and Constructions Ready for Painting.** H. W. Dunker. *Chemie-Ingenieur-Technik,* v. 25, no. 11, Nov. 1953, p. 641-650.

Economical importance of pretreatment of iron surfaces. Tables, graphs, micrographs, diagrams, photographs. 24 ref. (R10, L26, Fe)

75-R. (German.) **Stray Current in Gas Lines in Berlin and Their Elimination.** Manfred Dewitz. *Gas und Wasserfach,* v. 94, Ausgabe Gas, no. 23, Dec. 1, 1953, p. 689-692.

Establishes existence of stray current. Corrosion effects on joints and welds. Precautions for electrochemical corrosion. Tables, photographs, graphs. (R1)

76-R. (German.) **Zinc for Roofs.** B. Trautmann. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 843-846.

Corrosion of zinc roofs depends largely on atmosphere. Discusses different designs. Photographs, diagram. (R3, T26, Zn)

77-R. (German.) **The Service Life of Sheet Zinc for Roofs.** H. Schneider. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 846-848.

Corrosion resistance of zinc roofs. Micrographs, photograph, tables. (R3, T26, Zn)

78-R. (German.) **Lead as a Corrosion Inhibitor in the Manufacture of Chemical Apparatus.** H. Hörger. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 878-880.

Intercrystalline and stress corrosion are factors which reduce wear resistance of lead. Photographs, diagram. (R10, Q9, Pb)

79-R. (German.) **An Experiment on the Oxide Growth on Metals.** B. Ilschner and H. Pfeiffer. *Naturwissenschaften,* v. 40, no. 23, 1953, p. 603-604.

Experimental results showed that an outward migration of cations was accompanied by a diffusion of oxygen. Micrographs. 12 ref. (R2, N1)

80-R. (Russian.) **Role of the Lead Dioxide Film During Corrosion of Lead Anode.** G. Z. Kir'iakov and I. A. Korchmarek. *Zhurnal Prikladnoi Khimii,* v. 26, no. 9, Sept. 1953, p. 921-924.

Effects of alloying additions on corrosion resistance of lead. Tables. 7 ref. (R2, Pb)

81-R. Electrolytic Etching of Stainless Steels. Results of Cooperative Testing Program for the Evaluation of the Oxalic Acid Etching Test. M. A. Streicher. **Electrolytic Etching in Oxalic Acid Used to Screen Cast CF-8 and CF-8M Stainless Steels From the 240-Hr. Nitric Acid Test.** F. H. Beck, N. D. Greene, Jr., and M. G. Fontana. **Screening Cast Stainless Steels by Electrolytic Etching in Oxalic Acid.** G. W. Jackson and W. A. Luce. *ASTM Bulletin,* 1954, no. 195, p. 63-74.

Includes tables, photomicrographs, photograph. 12 ref. (R11, SS)

82-R. $200 Million Down the Drain. *Bakelite Review,* v. 25, Jan. 1954, p. 16-18.

Application of pressure-sensitive vinyl tape to control corrosion on underground pipelines. Photographs. (R10, L26)

83-R. Chlorimet 2. Walter A. Luce. *Chemical Engineering,* v. 61, Feb. 1954, p. 246, 248, 250, 252.

Resistance of this material of construction to a number of corrosives, with physical properties and applications in chemical industry. Photograph, tables, diagrams. (R general, Q general, T29, Ni, Mo)

84-R. The Rate of Dissolution and the Passivation of Titanium in Acids With Ammonium Fluoride Added. M. E. Straumanis and C. B. Gill. *Electrochemical Society, Journal,* v. 101, Jan. 1954, p. 10-15.

Passivation of titanium by ammonium fluoride is caused by decrease in number of active local cathodes (covered by the salt film), and by the increase of overvoltage (polarization) on the free cathodes. Tables, graphs, 13 ref. (R10, Ti)

85-R. NBS Lab Corrosion Tests Yield 10-Year Field Data in Six Months. *Gas,* v. 30, Jan. 1954, p. 57-58.

Technique used should provide a valuable basis for predicting service of iron and steel structures exposed to various soils. Diagram. (R8, CI, ST)

86-R. Behaviour of Galvanized Steel in Sodium Benzoate Solution. P. T. Gilbert and S. E. Hadden. *Journal of Applied Chemistry,* v. 3, Dec. 1953, p. 545-546, 547-548.

Electrochemical measurements showed that in certain circumstances, steel became anodic to zinc. Reasons are discussed. Table. 5 ref. (R5, ST, Zn)

87-R. Hollow Drill Steels. W. W. Durand. *Mining Congress Journal,* v. 40, Jan. 1954, p. 44-46.

Some observations on scaling rate at various times and temperatures. Graphs, photographs. (R2, TS)

88-R. Laboratory Measurement of Corrosion in Soils. *National Bureau of Standards, Technical News Bulletin,* v. 38, Jan. 1954, p. 13-14.

Six-month test is shown to agree with ten-year field tests. Cell uses differential aeration of metal disks in contact with soil. (R8)

89-R. Corrosion Resistance of Galvanized-Steel-Stitched Aluminum Alloys. *National Bureau of Standards, Technical News Bulletin,* v. 38, Jan. 1954, p. 14-15.

Tests were made with sheets of aluminum clad and unclad aluminum alloy in marine atmospheres and in sea water. Photographs. (R3, R4, Al)

90-R. The Water Side Deterioration of Diesel Cylinders. F. L. La Que. *Power Engineering,* v. 58, Jan. 1954, p. 76-77.

Successful application of high chromate concentrations, material selection, vibration dampening, and air injection. Photographs. 3 ref. (R4)

91-R. Does Antifreeze Destroy Cars? *Railway Age,* v. 136, Jan. 18, 1954, p. 22-24, 26.

Tests of corrosion from calcium chloride applied to coal and ore to prevent lading freezing to car. Photographs, tables, graph, diagram. (R6, R7)

92-R. Rust Hasn't a Chance. Carl O. Durbin. *SAE Journal,* v. 62, Jan. 1954, p. 30-33.

Based on paper "Corrosion Protection During Processing, Storage, and Shipment—Automotive Application" presented at SAE Summer Meeting, Atlantic City, June 8, 1953. Photographs. (R3)

93-R. A Fundamental Investigation of Fretting Corrosion. H. H. Uhlig, I. Ming Feng, W. D. Tierney and A. McClellan. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3029, Dec. 1953, 52 p.

Summarizes all phases of an investigation of fretting corrosion which has been conducted over a period of several years. Photographs, tables, diagrams, graphs. 32 ref. (R1, CN)

94-R. (Russian.) **Effect of Heat Treatment on Intercrystalline Corrosion Resistance of Stainless Steel 1Kh18N9T Containing Various Ratios of Carbon and Titanium.** E. I. Astrov and V. N. Biriukova. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 61-65.

Tests show that quenching temperature for optimum properties depends on grain size, carbon content, and carbon-titanium ratio. Micrographs, tables. 5 ref. (R2, J26, SS)

95-R. Corrosion Characteristics of Alloying Elements of Stainless Steels in Oxidizing Solutions. Corrosion of Chromium. M. M. Kurtepov and G. V. Akimov. Henry Brutcher, Altadena, Cal., Translation no. 3036, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 87, no. 5, 1952, p. 795-796.)

Previously abstracted from original. See item 351-R, 1953. (R5, Cr, SS)

96-R. Development of Cathodic Protection in Belgium. A. Weiler. *Chemistry & Industry,* 1954, no. 3, Jan. 16, p. 56-63.

Translation of a paper read at a Symposium on Cathodic Protection, organized by the Corrosion Group of the Society, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2., Nov. 13, 1953. Shows how a particular case of protection against stray currents started a train of research which led to development of means of protection against corrosion from all sources. Diagrams, graphs. (R10)

97-R. A Suggested Method of Evaluating the Porosity of Coatings on Ferrous Metals. T. W. Farrer. *Chemistry & Industry,* 1954, no. 3, Jan. 16, p. 77-78.

This objective is sought either by simulating corrosive conditions to which coating will be exposed in service, or by employing artificial means whereby porosity may be revealed. 3 ref. (R11, Sn, Zn, Fe)

98-R. Corrosion and Cathodic Protection. G. G. Portch and W. Godfrey Waite. *Coke and Gas,* v. 16, Jan. 1954, p. 19-23.

Causes of corrosion in buried gas mains and other structures. Means for eliminating this corrosion. Tables, diagrams, photographs. (R8, R10, ST)

99-R. Experiences With Filming Amines in Control of Condensate Line Corrosion. H. L. Kahler and J. K. Brown. *Combustion,* v. 25, Jan. 1954, p. 55-58.

Experimental studies. Photographs, diagram, tables. 4 ref. (R10, CN)

100-R. Corrosion Inhibition in Acid Solution. Cecil V. King and Edward Hillner. *Electrochemical Society, Journal,* v. 101, Feb. 1954, p. 79-83.

Measurements of effectiveness of three inhibitors on iron, zinc and cadmium specimens in nitrate solutions. Tables. 13 ref. (R10, Fe, Zn, Cd)

101-R. Microstructure and the Corrodibility of Steel in Inhibited Hydrochloric Acid Solutions. P. H. Card-

well. *Electrochemical Society, Journal,* v. 101, Feb. 1954, p. 84-90.

Two acid inhibitors were examined to investigate materials which could be used satisfactorily to protect steels with various grain structures. Tables, graph, photomicrographs. 10 ref. (R10, R5, CN)

102-R. Why Hot Water Storage Tanks Corrode. T. S. Howald. *Gas Age,* v. 113, Jan. 28, 1954, p. 15-18, 46-48.

Part of symposium presented at Case Institute of Technology, Cleveland, Aug. 24-27, 1953. Galvanic corrosion may be minimized by proper material selection use of dielectric couplings and employing sacrificial anodes. Operating temperatures below 140° F. and use of larger tanks to avoid overheating add to life of equipment. Graphs, table. 28 ref. (R4, R1, CN)

103-R. The Oxidation of Titanium at High Temperatures in an Atmosphere of Pure Oxygen. A. E. Jenkins. *Institute of Metals, Journal,* v. 82, Jan. 1954, p. 213-221 + 1 plate.

Investigation in temperature range 600-925° C. at an oxygen pressure of 700 mm. of mercury. Graphs, tables. 13 ref. (R2, Ti)

104-R. Corrosion of Nickel Cast Irons in Soils. Irving A. Denison and Melvin Romanoff. *Journal of Research, National Bureau of Standards,* v. 51, Dec. 1953, p. 313-320.

Results of measurements of corrosion and strength of nickel cast irons after exposure to different soil conditions for a maximum of 14 years. Photographs, tables. 4 ref. (R8, Q23, CI)

105-R. How Does Wrought Iron Stand Up in Corrosive Marine Services? J. Lyell Wilson. *Marine Engineering,* v. 59, Feb. 1954, p. 63-66.

Lack of correlation between testing results and service records. Graphs, photographs, tables. (R3, R4, Fe)

106-R. Don't Be Misled About "Corrosion Resistance". W. L. Nelson. *Oil and Gas Journal,* v. 52, Feb. 1, 1954, p. 98.

Data on common corrosion resistant alloys and steels. Table. (R general, AY, SS, Fe, Zn, Ni, Cr, Mo, Cu)

107-R. Corrosion—Prevention and Control. B. C. Thiede. *Paint Industry Magazine,* v. 69, Jan. 1954, p. 31-33.

Use of noncorrosive equipment, paint and cleaning. Corrosion field tests. (R general, L general)

108-R. Cathodic Protection of Pipelines and Storage Tanks. A. G. Thomson. *Petroleum,* v. 17, Feb. 1954, p. 54-55, 64.

Review of current Russian practice and equipment. (R10)

109-R. Machine Tool Corrosion by Soluble Cutting Oils. II. *Product Finishing,* v. 7, Jan. 1954, p. 74-86.

Results of investigation of the corrosive action of 11 oils on cast iron similar to that used in machine tool construction. Tables, graphs. (R7, CI)

110-R. Inhibition of Corrosion of Nitrided Steel in Sulfuric Acid. S. A. Balezin and V. B. Ratinov. Henry Brutcher, Altadena, Cal., Translation no. 2984, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 85, no. 2, 1952, p. 367-368.)

Previously abstracted from original. See item 529-R, 1952. (R10, ST)

111-R. On the Mechanism of Corrosion Fatigue. G. V. Karpenko. Henry Brutcher, Altadena, Cal., Translation, no. 3159, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 77, no. 5, 1951, p. 827-830.)

Previously abstracted from the original. See item 294-R, 1951. (R1, ST)

112-R. (Russian.) **The Rusting of Steel Objects Due to Penetration of Water Vapor, Sulfur Dioxide, and Hydrogen Sulfide Through a Layer of Spindle Oil.** V. V. Skorchelletti and S. D. Vasil'ev. *Zhurnal Prikladnoi Khimii,* v. 26, no. 10, Oct. 1953, p. 1033-1038.

Results demonstrate possibility of rusting under an oil layer. Tables, graphs, drawings. 3 ref. (R7)

113-R. (Book.) **Corrosion Testing Procedures.** F. A. Champion. 355 p. 1952. Chapman & Hall, London. 36 s.

British edition of book published by John Wiley & Sons. See item 482-R, 1952. (R11)

S

Inspection and Control

64-S. Quality Control in the Foundry. James M. Barabee. *American Foundryman,* v. 25, Jan. 1954, p. 50-54.

Present program in one company. Photographs, graphs. (S12, E general)

65-S. A Common Tolerance System. F. W. M. Lee. *Automobile Engineer,* v. 43, Dec. 1953, p. 560-562.

American, British and Canadian proposals critically examined. Graphs. (S22)

66-S. National Physical Laboratory Interferometer. D. C. Barnes and M. J. Puttock. *Engineer,* v. 196, Dec. 11, 1953, p. 763-766.

An interferometer for routine measurements of length dimension of slip and block gages. Tables, diagrams, photographs. 4 ref. (S14)

67-S. Mobile Engineering Radiographic Unit. *Engineer,* v. 196, Dec. 25, 1953, p. 837-838.

Equipment and operating characteristics. Photographs. (S13)

68-S. Practical Application of the New British Standard System of Limits and Fits. G. J. Pearmain. *Engineer,* v. 196, Dec. 25, 1953, p. 848-852.

Abstracted from paper presented at British Inst. of Mech. Engr., Dec. 1953. Means by which new system can be most efficiently applied in industry. Graphs, table, diagram. (S22)

69-S. New Ultrasonic Testing Method. Thomas A. Dickinson. *Foundry Trade Journal,* v. 95, Dec. 17, 1953, p. 763-765.

Apparatus and techniques. Compares method with others in use. Diagram, photographs. (S13)

70-S. Cobalt 60—Inspection Uses Are Growing. D. E. Brewer. *Iron Age,* v. 172, Dec. 31, 1953, p. 80-82.

Cobalt 60 inspection being used to detect flaws in casting and weldments subject to severe stresses, locates hidden elements in internal assemblies and uncovers internal holes and voids. Photograph, radiographs. (S13, S19, Co)

71-S. The Tungsten-Molybdenum Thermocouple for Immersion Pyrometry. I. The Characteristics of the Tungsten-Molybdenum Thermocouple. J. P. Simons. **II. The Tungsten-Molybdenum Immersion Pyrometer.** C. G. Hamstead and E. J. Burton. *Iron and Steel Institute, Journal,* v. 175, Dec. 1953, p. 402-407.

Laboratory and works studies have been made of possibility of using tungsten-molybdenum thermocouple for measuring temperature of liquid steel. Diagrams, graphs, table. 21 ref. (S16, W, Mo)

72-S. Hydraulic Load Cells. *Mechanical World and Engineering Record,* v. 133, Dec. 1953, p. 534-536.

Compact and relatively simple method of measuring loads from a few pounds to 500 tons or more. Diagrams. (S general, Q general)

73-S. Effects of Source and Specimen Dimensions on Resolution in Gamma Radiography. A. J. Stevens. *Nondestructive Testing,* v. 11, Nov.-Dec. 1953, p. 13-15.

A general quadratic equation which expresses dispersion to be expected from a gamma source in terms of geometry of exposure setup. Curve relates specimen dimensions to source-film distance for a "standard" source. Diagram, graph, tables. (S13)

74-S. A Technique for Gamma Ray Exposure Determination. Charles E. Juran. *Nondestructive Testing,* v. 11, Nov.-Dec. 1953, p. 25-26.

Simple, rapid method which allows visual comparison of physical arrangements of apparatus. Graphs. (S13)

75-S. Ultrasonic Inspection Using Automatic Recording and Frequency Modulated Flaw Detector. Donald C. Erdman. *Nondestructive Testing,* v. 11, Nov.-Dec. 1953, p. 27-31.

Requirements for complete description of internal flaws, including depth to the flaw and its area. Diagrams, photographs. (S13)

76-S. Some Experimental Findings and Operating Practices in Betatron Radiography. Norman C. Miller and John D. Steely. *Nondestructive Testing,* v. 11, Nov.-Dec. 1953, p. 35-40.

Results of experience and experimentation at one betatron installation including typical applications. Table, photographs, diagrams, graphs. 7 ref. (S13)

77-S. Acceptance Sampling of Electroplated Articles. J. M. Cameron and Fielding Ogburn. *Plating,* v. 41, Jan. 1954, p. 43-46.

Basic ideas behind acceptance sampling procedures which have found widespread usage in governmental and industrial purchasing. Graphs. 3 ref. (S12)

78-S. An Ultrasonic Apparatus for Non-Destructive Testing of Materials. J. Krautkrämer, H. Krautkrämer and O. Rüdiger, Henry Brutcher, Altadena, Cal., Translation no. 2879, 10 p. + 1 plate. (From *Archiv für das Eisenhüttenwesen,* v. 20, nos. 11-12, 1949, p. 355-358.)

Previously abstracted from original. See item 70-S, 1950. (S13)

79-S. Measurement of Metal Thicknesses of Up to About $\frac{33}{64}$ Inch With X-Rays and Geiger Counter. H. W. Fritze. Henry Brutcher, Altadena, Cal., Translation no. 3058, 5 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 16, 1952, p. 943-945.)

Previously abstracted from original. See item 442-S, 1952. (S14)

80-S. Measurement of Thicknesses Below One Millimeter (0.04") With Beta Rays. A. Trost. Henry Brutcher, Altadena, Cal., Translation no. 3057, 8 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 16, 1952, p. 941-943.)

Previously abstracted from original. See item 442-S, 1952. (S14)

81-S. Measuring the Thickness of Non-Magnetic Layers on Non-Magnetic Basis Materials With Beta Rays and Counting Tube. R. Berthold. Henry Brutcher, Altadena, Cal., Translation no. 3060, 8 p. + 1 plate. (From *Stahl und Eisen,* v. 72, no. 16, 1952, p. 945-947.)

Previously abstracted from original. See item 442-S, 1952. (S14)

82-S. Nondestructive Ultrasonic Testing by the Pulse-Echo Technique. A. Lutsch. Henry Brutcher, Altadena, Cal., Translation no. 3070, 18 p. + 1 plate. (From *Archiv für das Eisen-*

hüttenwesen, v. 23, nos. 1-2, 1952, p. 57-65.)

Previously abstracted from original. See item 181-S, 1952. (S13, M23)

83-S. Determination of Gases in Ferrous Metals. Communication I: Redesign of Apparatus for Vacuum-Fusion Method. Yu. A. Klyachko, A. G. Atlasov and E. M. Chistyakova. Henry Brutcher, Altadena, Cal., Translation no. 3103, 15 p. + 1 plate. (From *Zavodskaya Laboratoriya*, v. 16, no. 1, 1950, p. 17-23.)

Application of vacuum-fusion method for determination of total quantity of hydrogen, oxygen, and nitrogen present in iron and steel. Tables, diagrams. 9 ref. (S11, Fe, ST)

84-S. (French.) Installation of a Source of 30° C. of Radiocobalt Intended for Radiochemical Research. A. Chapiro, M. Cottin, M. Haissinsky, M. Magat and C. Vermeil. *Journal de physique et le radium*, v. 14, no. 12, Dec. 1953, p. 687-689.

Installation of Co^{60}, transporting and placing of source in the installation and protection apparatus necessary for its use in radio-chemistry. Diagrams. (S19, Co)

85-S. (German.) An Interference-Optical Instrument for Measuring Thickness of Thin Metal Films. M. Dühmke and K.-G. Georgi. *Metall*, v. 7, nos. 23-24, Dec. 1953, p. 1000-1002.

Design and use of instrument. Diagrams, photographs. 4 ref. (S14)

86-S. (German.) Evaluating Technical X and Gamma-Ray Recordings in the Technique of Measuring. E. A. W. Müller. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 95, no. 32, Nov. 11, 1953, p. 1093-1097.

Proper selection of probes for controlling quality of recordings. Different influences on photographic recordings. Tables, graphs. 9 ref. (S14, Al, ST)

87-S. (German.) Application of Statistical Procedures to the Problem of Materials Technology. Hans Bühler and W. Schreiber., *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 95, no. 33, Nov. 21, 1953, p. 1119-1124.

Shows that statistical methods can be applied to fatigue testing and to determine service life of metal molds. Tables, graphs. 15 ref. (S12, Q7, S21)

88-S. (German.) Nondestructive Electronic Sorting of Metals by Their Physical Properties. H. H. Rust. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 95, no. 34, Dec. 1, 1953, p. 1158-1159.

Process based on electrical conductivity and permeability of materials. Graphs, microphotographs. 2 ref. (S10)

89-S. (Russian.) Testing of Application of Statistical Methods in Analysis and Control of Foundry Production. A. I. Antonov, P. I. Kantor and M. S. Mirkin. *Liteinoe Proizvodstvo*, 1953, no. 8, Aug., p. 20-24.

Method assisted in administration and reduced spoilage. Diagram, graphs, tables. 2 ref. (S12, E general)

90-S. NBS Has Program of Research and Development in Basic Instrumentation. *Industrial Gas*, v. 32, Jan. 1954, p. 8-9, 23-24.

Surveys of available instruments and techniques; projects for evaluation of new applications to general and specific problems; and specialized projects. Photographs. 8 ref. (S16, S18)

91-S. Pneumatic Gauging Applied to the Measurement of the Bore of Tube. R. Chittleburgh, E. F. Powell, and G. F. Morton. *Journal of Scientific Instruments*, v. 31, Jan. 1954, p. 20-22.

Method using a steel ball in a tube held by an electromagnet. Diagrams. 4 ref. (S14)

92-S. How Form Tolerances Affect Gaging Requirements. IV. Earle Buckingham. *Machinery*, v. 60, Jan. 1954, p. 184-190.

How tolerances on form, particularly tapers, are selected and how they determine gaging requirements. Diagrams. (S14)

93-S. The Best Performance From Beta Gages. L. R. Zumwalt. *Nucleonics*, v. 12, Jan. 1954, p. 55-58.

Thickness measurements by transmission or reflection. 6 ref. (S14)

94-S. What's New in Nondestructive Testing. S. A. Wenk. *Steel*, v. 134, Jan. 18, 1954, p. 78-81.

Wide variety of equipment is available to meet diverse needs of industry. Where possible, inspection and testing are being put right into production line. Photographs, diagram. (S13)

95-S. Know Your A, B, C's of Government Specifications. Allen G. Gray. *Steel*, v. 134, Jan. 18, 1954, p. 100-103.

Simplification of system. Tables, photograph. (S22)

96-S. The Non-Destructive Testing of Wire by Means of Ultrasonics. Reimar Pohlman. *Draht (English Ed.)*, 1953, no. 17, Dec., p. 24-26.

Apparatus, techniques, and applications of test method. Graph, diagrams, photographs. 1 ref. (S13)

97-S. (French.) Methods for the Preparation and Analysis of Samples of Very High Purity Iron. J. Talbot, Albert M. Caron and G. Chaudron. *Revue de métallurgie*, v. 50, no. 12, Dec. 1953, p. 817-826; disc., p. 827-828.

Nonmetallic impurities were determined by micro-analysis. Metallic impurities were determined by irradiation. Properties of high-purity iron were studied. Micrograph, diagram, tables, graph, photographs. 8 ref. (S11, M21, Fe)

98-S. (German.) Status of Measuring Temperature by Immersion in Foundries. Kurt Guthmann. *Stahl und Eisen*, v. 73, no. 26, Dec. 17, 1953, p. 1693-1703; disc., p. 1703-1705.

Reviews published reports and research results on optical immersion pyrometers, immersion thermocouples, and methods of measuring temperature of melts. Diagrams, photographs, tables, graphs. 141 ref. (S16, E10)

99-S. (German.) Ultrasonic Testing of Round Steel Bars for Internal Defects. Heinz Günther Brandt. *Stahl und Eisen*, v. 73, no. 26, Dec. 17, 1953, p. 1717-1720.

Tests were made on 30 to 90-mm. bars of high speed toolsteel by the impulse-echo process. Results were satisfactory for bars over 40 mm. in size. Diagrams, graphs, table. (S13, TS)

100-S. (German.) Sampling Aluminum and Copper Alloys. August Buckeley. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 6, no. 12, Dec. 1953, p. 473-477.

Differences in composition due to segregation in liquid state or during freezing process. Proper procedure for sampling. Diagrams, graphs. 9 ref. (S12, C5, Cu, Al)

101-S. Radiographic Characteristics of High-Energy X-Rays. A. L. Pace. *Foundry*, v. 82, Feb. 1954, p. 109-111, 178.

Application of high-voltage radiography results in considerable savings in salvage and repair of heavy cast parts. Photograph, radiographs, graphs. (S13)

102-S. Standards for Aluminium Casting Alloys. F. H. Smith. *Light Metals*, v. 17, Jan. 1954, p. 17-20.

Compares British and foreign specifications and chemical composition of various aluminum alloys. Tables. (To be continued.) (S22, Al)

103-S. Determining Weight Electronically. Verne C. Kennedy. *Mechanical Engineering*, v. 76, Feb. 1954, p. 159-165.

Three basic elements, load cells, servosystem and data-presentation device. Photographs, diagrams. (S general)

104-S. A New Method of Analyzing Extreme-Value Data. Julius Lieblein. *U. S. National Advisory Committee for Aeronautics, Technical Note*, 3053, Jan. 1954, 88 p.

Method of application. Techniques provide simple means for estimating necessary parameters, making predictions from fitted curve, estimating reliability and evaluating efficiency of the method. Graphs, tables. 21 ref. (S12)

105-S. (French.) Application of Supersonics for the Inspection of Welds. G. A. Homes and J. van Leemput. *Revue de la Soudure (Brussels)*, v. 9, no. 4, 1953, p. 214-225.

Methods and apparatus. Use of supersonics to detect suspected areas for subsequent X-ray photography. Photographs, graphs, diagram. (S13, K9)

106-S. (Book.) Industrial Specifications. E. H. Mac Niece. 158 p. 1953. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $4.50.

Need for better specifications plus other associated topics. (S22)

107-S. (Book.) Select Methods of Metallurgical Analysis. W. A. Naish, J. E. Clennell, and V. S. Kingswood. 2nd Ed. 1953. Chapman & Hall, Ltd., 37-39 Essex St., London, W.C.2, England. £3-5-0.

Designed for metallurgical chemists and advanced students. (S11)

108-S. (Book.) The Tool Steel Trouble Shooter. Bethlehem Steel Co., Bethlehem, Pa.

A practical handbook to help identify and correct most frequent causes of tool and die failures. (S21, TS)

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Applications of Metals in Equipment

50-T. Materials for Central Station Pumps. J. B. Godshall. *Corrosion*, v. 10, Jan. 1954, p. 21-24.

Corrosion-erosion in feed pumps has been substantially eliminated by changing to resistant materials, particularly steels containing 5% or more of chromium. Micrographs. (T29, R1, AY)

51-T. Some Recent Developments in Aluminum Foil Packaging of Foods. J. M. Fultz. *Food Technology*, v. 8, Jan. 1954, p. 19-21.

Composition, manufacture and applications. Photographs. (T10, Al)

52-T. Light Alloy Bodies for Road Haulage Vehicles. *Machinery Lloyd (Overseas Ed.)*, v. 25, Dec. 19, 1953, p. 100-102.

Advantages of aluminum alloy in construction of commercial vehicles. Diagrams. (T21, Al)

53-T. Alphabetical List of Some of the More Common Refinery Alloys and Steels. V. W. L. Nelson. *Oil and Gas Journal*, v. 52, Jan. 4, 1954, p. 100.

Data sheet. (T29)

54-T. Aluminium for Prefabrication. *Overseas Engineer,* v. 27, Jan. 1954, p. 212-213.

Versatility of light alloys in non-traditional construction. Mobility, ease of delivery and erection, adaptability and attractive appearance of units. Photographs. (T26, Al)

55-T. Low Inertia Flywheel Design Using New Materials. J. R. Harkness. *Precision Metal Molding,* v. 12, Jan. 1954, p. 50, 52.

Aluminum die casting and a magnet have reduced weight and improved performance of flywheel for a power lawnmower. Photograph. (T10, Al)

56-T. Etching Magnesium for Photoengraving. H. E. Swayze. *Printing Equipment Engineer,* v. 84, Dec. 1953, p. 84-85, 143.

Abstract of address delivered before American Photoengravers Convention, Boston, Oct. 1953. Development of magnesium as an engraving metal. Various factors affecting its use. Photographs. (T9, Mg)

57-T. (English.) **High Carbon Wire for Prestressed Concrete.** *Aciers Fins & Spéciaux Francais,* 1953, no. 15, Nov., p. 43-46.

Use of steel wire specially designed for requirements of prestressed concrete. Photographs. (T26, ST)

58-T. (Dutch.) **Discussion on Semiconducters.** *Bedrijf en Techniek,* v. 8, no. 189(24); Electronica section, v. 6, no. 136, Nov. 21, 1953, p. 189.

History and production of germanium by reduction from its compounds. (T1, Ge)

59-T. (German.) **Old and New Uses of Zinc.** K. Bayer. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 838-842.

Various uses of zinc and zinc alloys. Photographs, tables. 11 ref. (T general, Zn)

60-T. (German.) **The Storage-Battery Industry.** D. Evers. *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 881-885.

Design and uses of different types of storage batteries. Required quality of lead used in storage batteries and salvaging of old batteries. Photographs. (T1, A8, Pb)

61-T. (Hungarian.) **Evaluation of Aluminum-Base Bearing Metals From a Metallographic Point of View.** Zoltan Buray. *Aluminium (Budapest),* v. 5, no. 10, Oct. 1953, p. 216-220.

Properties necessary in bearing metals. Aluminum-bearing metals of various composition. Experiments in Hungary with aluminum-silver-lead alloy bearings. Tables, micrographs, graph.
(T7, M27, SG-c, Al)

62-T. Wire Rope for the Steel Industry. A. J. Morgan. *American Iron and Steel Institute, Preprint,* Oct. 8, 1953, 8 p.

Paper presented at Chicago Regional Technical Meeting of AISI, Oct. 8, 1953. (T7, D general)

63-T. Metallurgical Aspects of Chain Manufacture. J. Waring. *Australasian Engineer,* 1953, Nov., p. 52-58.

Welding, casting, and forging problems in manufacture of various types of chains. Graphs, photographs, micrographs, diagram, tables. 27 ref. (T7, CN)

64-T. Selection of Permanent Magnet Materials. Charles A. Maynard. *Electrical Manufacturing,* v. 53, Jan. 1954, p. 114-119.

Influence of magnetic characteristics; application and design factors; material properties; and manufacturing methods in selecting best material from 19 types of cast, sintered, or formed materials now available. Graphs, tables, photographs. 16 ref. (T1, P16, SG-n)

65-T. For Al-Cu Connections—Pressed Aluminum Proves Best. Martin D. Bergan. *Electrical World,* v. 141, Feb. 1, 1954, p. 47-48, 50.

Laboratory tests and survey of utility experience show advantages when properly designed and installed over many other types of connectors. Graphs, photographs. (T1, Al)

66-T. Mold Irons for the Glass Industry. Newton Davis. *Glass Industry,* v. 35, Jan. 1954, p. 19-20.

General requirements and effect of alloying elements. Describes five types. Micrographs. (T29, CI)

67-T. Where to Use Tantalum. Tom M. Gayle. *Materials & Methods,* v. 39, Jan. 1954, p. 94-95.

Its properties make it desirable for corrosion resistant and electronic products. Photographs.
(T general, Ta)

68-T. High Strength Low Alloy Steels in Transformer Equipment. M. M. Aronson. *Materials & Methods,* v. 39, Jan. 1954, p. 134-136.

Thinner sections of higher strength steels in transformer equipment reduce weight and ease shipping and handling problems. Photographs. (T1, AY)

69-T. You Can Use Aluminum Like Wood. Herb Pfister and Harry Walton. *Popular Science,* v. 163, Dec. 1953, p. 158-167.

A new use for aluminum is introduced, especially made for the household. Photographs, diagrams. (T10)

70-T. Electrolytic Capacitors. Emery Deutsch. *Radio-Electronics,* v. 25, Feb. 1954, p. 69-70.

A comparison of tantalum anode foils to aluminum is presented. Photographs, graphs. (T1, Al, Ta)

71-T. Aluminum Brightens Its Home Market. *Steel,* v. 134, Jan. 25, 1954, p. 58.

Increasing number of applications for aluminum. Photograph.
(T10, Al)

72-T. Geometry of Wire Ropes. Frederico Hruska. *Draht (English Ed.),* 1953, no. 17, Dec., p. 29-32.

Different types of wire ropes are explained with aid of diagrams of their cross sections. Tables, diagrams. (T7)

73-T. (French.) **Application of Nodular or Spheroidal Graphitic Cast Iron for Rolling Mill Rolls.** M. Neuville. *Centre de Documentation Siderurgique, Circulaire d'Informations Techniques,* 1953, no. 12, p. 1937-1941.

Because of high strength and ductility after heat treatment, materials gave good results when used for rollers. (T5, Q general, CI)

74-T. (German and French.) **Copper in the Refrigeration Industry.** F. Hermann. *Pro-Metal,* v. 6, no. 36, Dec. 1953, p. 266-270.

Uses of tubes and connections. Photographs, diagram. (T27, Cu)

75-T. (German.) **Composition and Strength of Structural Steels for Bridges From the Period 1870-1880.** Ernest Hermann Schulz and Wilhelm Bischof. *Stahl und Eisen,* v. 73, no. 24, Nov. 19, 1953, p. 1583-1590.

Results reveal that puddled steel is unsatisfactory for bridge building. Bessemer steels were found to be better but still below present standards. Tables, graphs. 11 ref.
(T26, Q23, CN)

76-T. (Russian.) **Practical Test of Hydroturbines With Carbon Steel Vanes.** S. S. Astaf'ev and G. A. Bronovskii. *Vestnik Mashinostroeniia,* v. 33, no. 9, Sept. 1953, p. 24-27.

Operation of turbine and composition of steel. Tables, micrograph, photographs, diagram. (T25, CN)

77-T. Strap Steel for Prestressed Concrete Structures. K. P. Milbradt. *American Concrete Institute, Journal,* v. 25, Jan. 1954, p. 357-363; *ACI Proceedings,* v. 50, 1954, p. 357-363.

New type of prestressing steel offers possible economy in this type of construction. Graphs, photographs, diagrams. (T26, CN)

78-T. New Honeycomb Processing Method. Frank Charity. *Machine and Tool Blue Book,* v. 49, Feb. 1954, p. 156-160, 162.

Process used by an aircraft industry. Photographs. (T24)

79-T. Aluminum Tubing and Pipe. *Modern Metals,* v. 9, Jan. 1954, p. 46, 48-49.

Markets and new welding method. Photographs.
(T general, K6, Al)

80-T. Designing Magnesium Products. W. Z. Jarmicki. *Modern Metals,* v. 9, Jan. 1954, p. 54, 56, 58, 60.

Possibility of reducing cost of magnesium products with intelligent application of its properties in design. Diagrams. (T general, Mg)

81-T. The Growing Promise of Titanium. Julius J. Harwood. *Research Reviews, Office of Naval Research,* Dec. 1953, p. 1-7.

Summary of uses of titanium. Photographs, graph. (T general, Ti)

82-T. (French.) **Large Tanks of Aluminum. The Production of Polystyrene by the Ribecourt Factory.** *Revue de l'Aluminium,* v. 30, no. 205, Dec. 1953, p. 431-433.

Use of aluminum and aluminum alloys for tanks and bins used in production of polystyrene. Photographs. (T29, Al)

83-T. (French.) **After the Le Bourget and Farnborough Exhibitions. Aviation 1953.** Jean Guillemin. *Revue de l'Aluminium,* v. 30, no. 205, Dec. 1953, p. 435-476.

Includes "The Era of Helicopters"; "Present-Day Airplanes, and Construction Techniques"; "Some Aerodynamics"; "Engines and Reactors"; "Equipment and Materials"; "Light and Ultra-Light Alloys"; "Materials for Parts and Alloys of the Future"; "Ministry of Supply and Secretariats of State"; and "Brief Conclusions". Photographs, tables, diagrams, graphs. (T24)

84-T. (Book.) **Materials for Product Development.** 265 p. 1953. Clapp and Poliak, 341 Madison Ave., New York. $7.50.

Consists of 18 papers presented at the First Basic Materials Conference. Subjects include economics of engineering materials; high strength with low weight; high and low-temperature service; atomic energy; electrical and electronic service; materials selection and specification; and coordination in selection of materials. (T general, S22, A4)

85-T. (Book.) **Metallurgy and Construction.** E. M. H. Lips. 250 p. 1953. Elsevier Press, 402 Lovett Blvd., Houston 6, Tex.

For both metallurgist and designer, this volume brings study of metals into direct relationship with present-day construction techniques. (T26)

86-T. (Book—German.) **(Handbook of Cermet Tools) Handbuch der Hartmetallwerkzeuge.** v. I; **Herstellung und Anwendung von Dreh und Hobelwerkzeugen.** W. Dawihl and E. Dinglinger. 237 p. 1953. Springer-Verlag, Berlin, Germany. 15.60 DM.

Cemented carbide tools, their manufacture and effective use.
(T6, C-n)

V

Materials

General Coverage of Specific Materials

42-V. Bognalite J. Heat Treatable Aluminum Casting Alloy. *Alloy Digest,* no. Al-12, Jan. 1954.

Composition, physical constants, properties, heat treatment, machinability, and characteristics. (Al)

43-V. Meehanite GA. High Strength, Close Grain Iron Casting. *Alloy Digest,* no. CI-5, Jan. 1954.

Composition, physical constants, properties, machinability and general characteristics. (CI)

44-V. RY-AX. Heat Treated, Carbon-Manganese Steel. *Alloy Digest,* no. CS-1, Jan. 1954.

Composition, physical constants, properties, machinability and general characteristics. (CN, Mn)

45-V. C.D.C. Manganese Alloy No. 720. Heat-Treatable, Corrosion Resistant Alloy. *Alloy Digest,* no. Cu-14, Jan. 1954.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability and general characteristics. (Cu, Mn, Ni)

46-V. Ti-150A. Titanium-Base Alloy. *Alloy Digest,* no. Ti-2, Jan. 1954.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability and general characteristics. (Ti)

47-V. Van Chip. Tungsten-Molybdenum Type High Speed Steel. *Alloy Digest,* no. TS-16, Jan. 1954.

Composition, properties, heat treatment, machinability, workability, protective coatings, general characteristics and applications. (TS)

48-V. Fansteel 77. High-Density Tungsten Alloy. *Alloy Digest,* no. W-1, Jan. 1954.

Composition, physical constants, machinability, corrosion resistance, and applications. (W)

49-V. Some Methods of Preparation, Properties and Applications of Molybdenum. D. J. Jones. *Alloy Metals Review,* v. 8, Dec. 1953, p. 2-8.

Molybdenum is reported as promising material to withstand high temperatures and conditions of stress involved in gas turbines. Tables, graphs. 13 ref. (Mo)

50-V. Zirconium—From Rarity to Reactors. Charles A. Scarlott. *ASTM Bulletin,* 1953, no. 194, p. 45-46.

Properties, economics, processing and applications. Photographs, table. (Zr)

51-V. Vanadium—Properties, Occurrence, Beneficiation & Reduction. G. P. Mather and P. I. A. Narayanan. *Journal of Scientific & Industrial Research,* v. 12, sec. A, Nov. 1953, p. 510,514.

World production and occurrence. 10 ref. (V)

52-V. Developments in the Metallurgy of Tin and Its Alloys. J. W. Cuthbertson. *Metallurgia,* v. 48, no. 290, Dec. 1953, p. 277-281.

Recent progress in tinplate production, ternary and aluminum-tin bearing alloys and electrodeposition of tin-zinc and tin-nickel alloys. Photographs, micrographs, table. 12 ref. (L17, Sn)

53-V. The Present Status of Magnesium and Its Alloys. R. G. Wilkinson. *Metallurgia,* v. 48, no. 290, Dec. 1953, p. 282-288.

Survey of recent developments with particular attention to casting alloys containing zirconium and thorium, which have greatly improved properties at elevated temperatures. Photographs, tables, graphs, micrographs. 13 ref. (Mg)

54-V. Copper and Copper Alloys. A Survey of Technical Progress During 1953. E. Voce. *Metallurgia,* v. 48, no. 290, Dec. 1953, p. 289-298.

Material resources, extraction, fabrication, finishing, properties, applications, corrosion, welding and powder metallurgy. 230 ref. (Cu)

55-V. Tantalum. *Metal Treatment and Drop Forging,* v. 20, Dec. 1953, p. 590.

Difficulties in treatment, fabrication and handling due to absorption of gases. (Ta)

56-V. The Production and Uses of Beryllium. II. A. G. Thomson. *Mining Journal,* v. 241, Dec. 18, 1953, p. 724-725.

Properties, applications, availability and supply. (Be)

57-V. On the Properties of Spheroidal Graphite Cast iron. M. Ballay, R. Chavy and J. Grilliat. Henry Brutcher, Altadena, Cal., Translation no. 2952, 2 p. + 1 plate. (Abstract from *Fonderie,* v. 68, 1951, p. 2589-2604; v. 69, 1951, p. 2636-2652.

Previously abstracted from original. See item 172-V, 1951. (CI)

58-V. (English.) The Use of Silicon in Special Steel. *Aciers Fins & Spéciaux Francais,* 1953, no. 13, Mar., p. 25-32.

Importance, efficiency and properties of silicon when used as an alloy with iron and steel. Graphs. (Si, CI, AY)

59-V. (German.) The Malleable Zinc Alloy ZnMnlPb. J. Schramm, *Metall,* v. 7, nos. 21-22, Nov. 1953, p. 862-870.

Composition, melting, casting, extruding, drawing, shaping and forging. Properties, effect of various metal additions, corrosion resistance and prospective uses for the wrought alloy. Tables, graphs, diagrams, micrographs. 8 ref. (Zn)

60-V. (Hungarian.) Special Brass Alloys. Sandor Polgary. *Aluminium (Budapest),* v. 5, no. 12, Dec. 1953, p. 258-260.

Research results gained in the last two years in Hungary on handling and application of these materials. Foundry alloys, cold forming alloys and significance of zinc content. (T general, Cu, Zn, Al, Mn)

61-V. Aluminum Alloy Reference Sheet. Harry W. Fritts. *Chemical Engineering Progress,* v. 50, Jan. 1954, p. 54.

Composition, formability, heat treatment, weldability, corrosion resistance, properties. (Al)

62-V. New Heat Resistant Alloy. M. N. Ornitz and R. H. English. *Materials & Methods,* v. 39, Jan. 1954, p. 82-85.

Improved structural stability and resistance to oxidation make this nickel-chromium-iron alloy suitable for service to 2200° F. Photographs, graphs, tables. 2 ref. (R2, Q general, Ni, Cr, Fe)

63-V. Permanent Magnet Steels and Alloys. D. Hadfield. *Metal Treatment and Drop Forging,* v. 21, Jan. 1954, p. 15-24.

Permanent - magnet production process, manufacture and future trends. Photographs, tables, graphs. 18 ref. (SG-n)

64-V. New Techniques Tame Titanium. Robert Jaffee. *SAE Journal,* v. 62, Jan. 1954, p. 34-37.

Based on secretary's report of Panel on Titanium, Aeronautic Production Forum, SAE National Aeronautic Meeting, New York, April 20, 1953. Production, applications, and properties of titanium. (T24, Ti)

65-V. Germanium, a Secondary Metal of Primary Importance. Robert C. Fite. *Scientific Monthly,* v. 78, Jan. 1954, p. 15-18.

Historical recap with properties, occurrence, and uses. Photographs, diagrams. 4 ref. (Ge)

66-V. Titanium the Metal of 1954? Elmer H. Hahn, Jr. *Tooling and Production,* v. 19, Jan. 1954, p. 39-43.

Properties, availability, and applications. Photographs. (Ti)

67-V. (French and German.) PMG-Bronzes. H. Bovet. *Pro-Metal,* v. 6, no. 36, Dec. 1953, p. 254-260.

Origin, properties, and uses. Micrographs, tables, graph, photographs. (Cu, Zn)

68-V. (Polish.) Method and Production of Cobalt-Tungsten Alloy. St. Stolarz. *Prace Instytutow Ministerstwa Hutnictwa,* v. 5, no. 5, Sept.-Oct. 1953, p. 298-302.

Chemical composition, density, hardness, and strength properties. Microscopic observations. Photographs, tables, diagrams, micrographs. 3 ref. (Co, W)

69-V. Ceralumin "C". Nickel-Aluminum High Strength, Low Weight Casting Alloy. *Alloy Digest,* no. Al-13, Feb. 1954.

Composition, physical constants, properties, machinability, weldability and general characteristics. (Al)

70-V. Belmalloy. Pearlitic Malleable. Iron. *Alloy Digest,* no. CI-6, Feb. 1954.

Composition, physical constants, properties, machinability and general characteristics. (CI)

71-V. Allegheny 4750. High Magnetic Permeability, Low Expansion Iron-Nickel Alloy. *Alloy Digest,* no. Fe-4, Feb. 1954.

Composition, physical constants, properties, machinability, heat treatment, workability and general characteristics. (Fe, Ni, SG-p, s)

72-V. Dowmetal 01. Heat Treatable Magnesium Wrought Alloy. *Alloy Digest,* no. Mg-8, Feb. 1954.

Composition, physical constants, properties, machinability, workability, weldability, corrosion resistance, and general characteristics. (Mg)

73-V. Refractaloy 26. Precipitation-Hardened Super Heat Resistant Alloy. *Alloy Digest,* no. Ni-8, Feb. 1954.

Composition, physical constants, properties, heat treatment, machinability, weldability and general characteristics. (SG-h, Ni, Co)

74-V. AISI-4340. Nickel-Chromium-Molybdenum Alloy Steel. *Alloy Digest,* no. SA-14, Feb. 1954.

Composition, physical constants, properties, machinability, heat treatment, weldability and general characteristics. (AY)

75-V. Halvan. Shock Resistant Tool Steel. *Alloy Digest,* no. TS-17, Feb. 1954.

Composition, properties, heat treatment, machinability and general characteristics. (TS)

76-V. High Purity Chromium: Key to Better Alloys. H. L. Gilbert and H. A. Johansen. *Iron Age,* v. 173, Jan. 21, 1954, p. 93-96.

Production and physical and mechanical properties. Possibilities of new alloys with higher strengths at high temperatures. Photographs, photomicrographs, table. 15 ref. (Cr)

77-V. Beryllium: Metal with a Future. *Chemical Age,* v. 70, Jan. 23, 1954, p. 279-282.

Production and uses. 3 ref. (Be)

78-V. Selenium. Its Uses and Recovery. *Glass,* v. 31, Jan. 1954, p. 21-22, 24.

Shortage of product and possible sources of recovery. (Se)

79-V. Non-Heat-Treatable Titanium Alloys. Processing Details. T. A. Dickinson. *Light Metals,* v. 17, Jan. 1954, p. 16-17.

Processing, welding, cleaning and application. Physical, mechanical properties and corrosion resistance. Photographs, table. (Ti)

80-V. Titanium Metal and the Future. *Light Metals*, v. 17, Jan. 1954, p. 14-16. (From "Titanium Metal and Its Future", Harvard Graduate School of Business Administration. Copies available from Clifton D. Crosby, 439 Bronxville Road, Bronxville, N. Y. $10.)

Compares mechanical properties, corrosion resistance and cost of titanium with stainless steel, aluminum, magnesium, zirconium, copper and copper alloys and other metals and materials. Table. (To be continued.) (R general, Q general, Ti, SS, Al, Mg, Cu, Zr)

81-V. (Pamphlet.) **Titanium Bibliography.** PB111196. Battelle Memorial Institute for Watertown Arsenal. 204 p. 1952. Available from OTS, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo. $3.00.

A bibliography of titanium literature covering practically the entire industry between 1900 and 1951, with supplement for 1952. Listed are articles, arranged by authors and subjects, on sources of supply of raw material; its chemistry; and its physical and mechanical properties while being machined; joined, welded or otherwise shaped. (Ti)

82-V. (Pamphlet.) **Titanium Bibliography, 1900-1951; 1952 Supplement.** PB111196S. 52 p. 1953. Battelle Memorial Institute for Watertown Arsenal. Available from OTS, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo. $1.00.

Supplement covers literature of titanium appearing in 1952. Reflects rapid metallurgical growth of this important metal. (Ti)

83-V. (Book.) **Heat-Resisting Steels and Alloys.** C. G. Conway. 160 p. George Newnes Ltd., Tower House, Southampton Street, Strand, London W.C.2, England. 25s.

Carbon and low-alloy steels; bolt and valve steels; heat resistant casting alloys; austenitic steels of standard type; and iron-base and nickel-base alloys of proprietary type. (SG-h, ST, AY, SS, Ni)

84-V. (Book.) **Portfolio of Materials File Facts for Engineers, Designers, Metallurgists and Production Men.** Ed. 4. 112 p. Reinhold Publishing Corp., 330 W. 42nd St., New York 36.

Irons, steels, stainless steels, nonferrous metals, nonmetallic materials, and heat treating methods. (J general, Fe, ST, SS, EG-a)

85-V. (Book.) **The Rare Earths.** John Eisel, et al. 87 p. Feb. 1952. Harvard Graduate School of Business Administration, Cambridge, Mass. $5.00.

History, availability, uses, and future of the rare earths. (EG-g)

86-V. (Book.) **Sheet and Plate Product Information.** 149 p. 1953. Kaiser Aluminum and Chemical Sales, Inc., Kaiser Bldg., 1924 Broadway, Oakland 12, Calif.

Properties of aluminum; applications of sheet and plate alloys; fabrication and finishing methods. Comprehensive tables covering availabilities, properties, and other information of value to aluminum users. Separate pages are allotted to each standard alloy for ease of reference on mechanical properties and specific qualities. (Al)

87-V. (Book.) **Tungsten—Its Metallurgy, Properties, and Applications.** Ed. 3. Colin J. Smithells. 1953. Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. $8.50.

American edition of book published by Chapman & Hall. See item 137-V, 1952. (W)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

East

HEAT TREAT SUPERINTENDENT: Graduate metallurgist with heat treat experience preferred. Know steels and their treatments. Experienced in tool, die and small part work. Imaginative, capable, dependable. This is no ordinary job. Salary commensurate with ability. Give complete details in reply as to age, experience, availability, salary, and attach small photo. Box 3-15.

TOOLSTEEL SERVICEMAN: Experienced. Must know toolsteels and their applications and be free to travel extensively. Salary $600 per month. When writing, state training, experience and age. Box 3-20.

SENIOR PHYSICAL METALLURGIST: For research and development of high-temperature materials in the field of powder metallurgy. Experience in powder metallurgy not essential but minimum five years research desired. Salary open. Box 3-25.

Southeast

METALLURGIST: Academic opening for metallurgist having M.S. or Ph.D. degree for teaching and some research at an engineering school. Department small but with good potential. Salary and rank commensurate with qualifications. Box 3-30.

Midwest

GAS AND COMBUSTION ENGINEER: Large manufacturer has opportunity for graduate engineer, age 30-45, with majors in engineering, chemistry, combustion and thermodynamics. Should have experience in heat treating, design and engineering of gas circuits including oxygen, acetylene, propane and natural gas. To take charge of engineering and designing of flame hardening equipment. Salary open. Please send resume of personal data, education and experience. Box 3-35.

METALLURGICAL ENGINEER: Assistant to chief metallurgist required by large manufacturing company. Recent graduate with one to five years experience. Should be familiar with conventional as well as austempering, martempering, flame and induction hardness methods of heat treatment for production and research problems. Salary commensurate with experience. All replies held in strictest confidence. Send resume of background. Box 3-40.

MANUFACTURERS REPRESENTATIVE: Illinois, Wisconsin, Michigan and Indiana areas open for manufacturers representative for industrial furnace firm specializing in custom heat treat and forging furnaces. Write giving full particulars of education, experience and other lines represented. Box 3-145.

LIBRARIAN: Assistant in metallurgical and engineering company with wide interests. Must have technical training or experience. Should be able to catalog and handle reference work for research groups. Box 3-140.

West

IRON AND STEEL METALLURGIST: Practical graduate iron and steel metallurgist or man with few years experience in heat treat and cold or hot press steel fabrication. Long established corporation. Moving expenses not allowed. Location in Los Angeles, Calif. Box 3-45.

Government

Applications are being sought from metallurgists, physicists, chemists, mathematicians and electronic scientists for employment in various Federal Agencies in Washington, D.C., and vicinity. Salaries range from $3410 to $10,800 per year. To qualify, applicants must have had four years college study in an appropriate field, or four years of appropriate experience, or a combination of such education and experience. Further information and application forms may be obtained from most post offices or from the U. S. Civil Service Commission, Washington 25, D. C. Applications will be accepted until further notice and should be sent to the Executive Secretary, Board of U. S. Civil Service Examiners, National Bureau of Standards, Washington 25, D. C.

POSITIONS WANTED

METALLURGICAL ENGINEER: B.S. degree, age 34, married. Six years experience in heat treatment of all grades of steel, foundry (chilled and gray), ferrous and nonferrous metallography. Material inspection and testing, including nondestructive, material failure analysis and recommendation reports. Baldwin strain gage instrumentation. Desires testing and development field. Location immaterial. Box 3-50.

METALLURGICAL ENGINEER: M.S. degree, age 27. Six years experience. Research and development of materials for aircraft and chemical process industries, high temperature alloys, stainless steels, high strength steels, titanium, aluminum, ceramics, reinforced plastics. Broad background. Desires development or production in new and challenging metallurgical field. East or West preferred. Box 3-55.

METALLURGIST: Desires position in research, development and process engineering work. Qualified by 20 years experience in responsible positions with leading firms in U. S. A. and Canada, in ferrous and nonferrous process development and plant design. Box 3-60.

METALLURGICAL ENGINEER: Production, development or sales engineer in titanium. Ready to apply knowledge of five years of diversified experience in steel mills and alloy and stainless selling, all within one company through promotions. Willing to adapt to titanium through vigorous study and conscientious application. B. S. degree, age 28, married, one child. Prefers Midwest, but will relocate East or West. Box 3-65.

CONSULTING METALLURGIST: Director of technical processes, desires position utilizing his background with possibility of managerial advancement. Registered professional engineer, ferrous and nonferrous. Fabrication, plating, welding, heat treatment, including induction and flame-hardening. Specifications and inspection systems to cover service requirements. Minimum salary considered $10,000. Box 3-70.

METALLURGICAL ENGINEER: M.A., Ph.D. degrees, age 41. Metallurgical and chemical engineering background, experienced in powder metallurgy, particularly cemented carbides. Desires position in development, research or quality and process control. Box 3-75.

METALLURGIST: Age 43, family. Has had 21 years experience with four steel corporations in production, laboratory, research, sales service, strip, bar and wire, stainless alloy and basic steel. B.S. degree in chemistry. Located in East-Central area, laboratory development. Desires competent business connection. Resume on request. Box 3-80.

TECHNICAL DIRECTOR, METALLURGICAL EXECUTIVE or TECHNICAL ASSISTANT TO EXECUTIVE: Graduate metallurgical engineer, professional license, background of 19 years of cost-conscious production metallurgy in steel mill and heavy and light machinery manufacture. Active participation in purchasing, engineering, sales and customer problems, factory production problems, plans and methods. Box 3-85.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering, some graduate study. Age 29, married, family. Four years diversified experience in research and development laboratory including 1½ years in welding development. Interested in position with future in welding development and research. Prefers East. Box 3-90.

METALLURGICAL ENGINEER: Age 27, family. Three years as plant and development metallurgist, experienced in steel, high-temperature, stainless and titanium alloy forging, heat treating, testing, etc. Background and ability for position with increased responsibility in production or research. Box 3-95.

METALLURGIST: To receive M.S. degree in metallurgy in June. Veteran, age 25, married. Three years experience in both ferrous and nonferrous research including titanium. Desires responsible position in research and development. No location preference. Box 3-100.

METALLURGIST: B.S. degree in metallurgy, age 34, single. Eight years experience in ferrous metallurgy, all phases of physical metallurgy, including production process, testing, research and development. Heat treat drop forge experience, and also ordnance work such as shell production. No location preference. Box 3-105.

METALLURGICAL ENGINEER: B.S. Carnegie Tech., age 33, family. Six years experience in cupola operations and melting control in production and jobbing foundries producing alloyed gray irons. Presently employed as plant metallurgist. Limited blast furnace and openhearth experience. Desires position in production with progressive organization. Box 3-110.

METALLURGIST: B.S., M.S. degrees. Desires administrative position in production or research. Ten years experience covering metallography, product heat treating, research and development of methods and products, welding, steel melting, report writing and evaluation. Work of supervisory nature for past five years. Age 31, married, three children. Will relocate. Box 3-115.

METALLURGIST: Age 39, married. Desires location in California. Twelve years diversified experience in ferrous and nonferrous metals, including powder metallurgy, electroplating and sales. Desires responsible position in sales service problems and contact with industry. Presently employed in permanent status with large distributors of petroleum products as sales manager. Box 3-120.

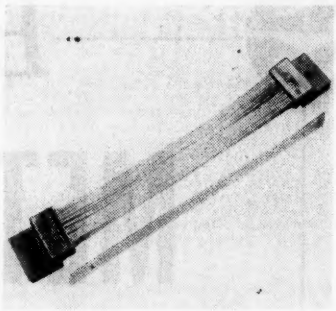
PHYSICAL METALLURGIST: Ph.D. degree, age 30. Eight years diversified and extensive supervisory experience in nonferrous alloy research. Knowledge of current theoretical and practical physical metallurgy, supplemented with strong background in mechanical metallurgy, thermodynamics, kinetics and X-ray diffraction. Ability to plan and execute comprehensive research program. Desires responsible and challenging position in teaching and academic research or in progressive industrial laboratory. Box 3-125.

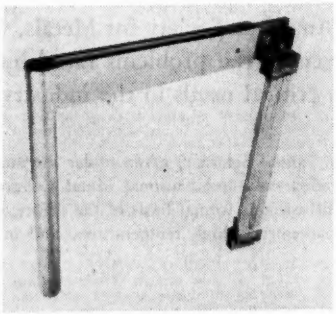
METALLURGICAL ENGINEER: Degree, age 32, married. Two years experience in research laboratory and field covering wear and fatigue tests. One and one-half years as metallographer and in various physical testing. Eight years of welding and related metalworking practice. Desires position in product development or research. Available June. Box 3-130.

METALLURGICAL ENGINEER: Age 29, married, two children. B.S. degree in metallurgical engineering. Experienced in openhearth, engineer and management trainee, research and test engineer, maintenance officer. Now in Army, expecting discharge in June. Desires position with managerial future, in Wisconsin or Minnesota area. Box 3-135.

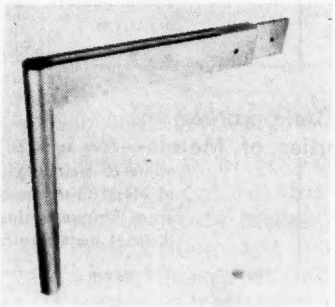
15 TO 25% SAVINGS

Copper to copper connections using flexible braid, plus cooling at the copper to copper terminals on the electrodes and transformer, aids in maximum efficiency of transfer of secondary power.

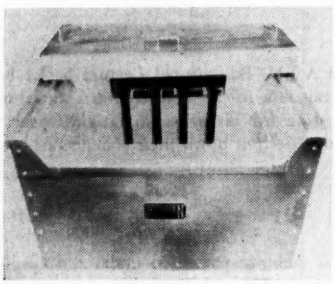




This type of assembly provides maximum efficiency and easy removal by your maintenance staff—normal time of electrode replacement, approximately 5 to 15 minutes depending on size.



This structure of electrode is basically used in furnaces with steel pots and with flexible cables as noted above, 15 to 20% increased efficiency is easily obtainable.



Electrode furnaces of this type are used for tempering and liquid carburizing, providing maximum efficiency.

CONVERSION

Any existing electrode furnace can be converted to Holden Electrode design or Holden furnace design, having a secondary voltage range from 10 to 42 volts.

FREE ENGINEERING: Engineering inspection service is available without any cost to you, to discuss how these savings can be made.

Free Literature on request:

Brief Description—Salt Baths
4 page bulletin on salts with additives
Austempering-Martempering
Sodium Hydride Descaling
Pot Furnaces
Carburizing baths
Hy Speed Case
Thermocouples

THE A. F. HOLDEN COMPANY

THREE F.O.B. POINTS — LOS ANGELES, DETROIT and NEW HAVEN